AN INVESTIGATION OF THE SENSORIMOTOR DEVELOPMENT OF DOWN'S SYNDROME INFANTS INVOLVED IN AN ECOLOGICALLY BASED EARLY INTERVENTION PROGRAMME

A LONGITUDINAL STUDY

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ERRATA

P. 1	Line 16	"able" to read "unable"
P. 3	Line 12	delete "see figure 1"
P. 12	last line	"visual" should read "usual"
P.308	table 6 No. 7	should read"labels sensory experiences"
P.310	Line 4	"to should read "two"
P.347	last line	"grouup" should read "group"
P.389	Paragraph 2 Line 3	"wide" should read "wider"
P.389	last paragraph last line	"friends " should read "parents"
P.400	Paragraph 2 Line 3	"development" should read "differences"

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ABSTRACT

An ecologically based longitudinal, interdisciplinary early intervention programme was set up for 11 D.S. infants and their families. Bronfenbrenner suggests that if early intervention is to be effective it must use the child's family as an active agent for implementing the programme.

Interest for the investigation was generated by current concern with the mainstreaming of handicapped children in ordinary schools, and the necessity for them to acquire the skills which will permit them to benefit from education alongside normal peers.

The intervention programme involved a weekly clinic attendance by the child and his/her caregiver at which procedures for stimulating physical, cognitive, language and social growth were demonstrated to the parents. The emphasis was on a parent-professional partnership. The weekly contact also provided opportunities for parents to gain support and understanding from one another as well as to learn about early child development and its relevance for their D.S. infants.

The study attempted to evaluate the success of the intervention programme by comparing the intervention sample with a contrast group of four D.S. infants born in Queen Mary Hospital, Dunedin, during a comparable time period, together with a close examination of the way the programme worked for the 11 infants and their families in the intervention group.

Assessments included systematic ongoing evaluation of infant progress in conjunction with more objective procedures and contextual information. By using a number of different instruments the study attempted to sample representative behaviours of both the child and his caregiver.

It was possible to show, that for the intervention sample the development of all subjects proceeded in a consistent stepwise pattern from birth to 2 1/2 years of age.

Although individual differences were apparent during the period of intervention, by the completion of the study all children had acquired mobility and the beginnings of language and personal social skills. Levels of cognitive competence were assessed as being only slightly behind those of normal children.

The findings are discussed within an ecological framework as proposed by Bronfenbrenner.

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CHAPTER I

INTRODUCTION

FOCUS OF THE STUDY

Mental retardation rates among the world's most complex and challenging problems. Genetic disorders of which Down's Syndrome (D.S.) is the most commonly occurring condition (with associated mental handicap) represents a priority for research. Despite what is known of D.S. chromosomal properties, incidence and prevalence, and physical and behavioural characteristics, we are not yet able to document the cause of nondisjunction, or to prevent is occurrence.

Attitudes towards the retarded are of significance because of their potential influence on the provision of services for the retarded, on the implementation of programmes and society's reactions towards the retarded and finally on the self-esteem of the handicapped person. The 19th century view of the retarded as being dangerous to society was replaced by a view of the "eternal child" (Gottlieb 1977) who had still to be protected but was considered ~~able~~ unable to benefit from appropriate intervention programmes. It seems as if this attitude still lingers on in many areas of our community.

Interest for the present study was generated by current concern with the mainstreaming of handicapped children in ordinary schools (Kavale 1979, Meisels 1977) and the necessity for these children to acquire the skills which will allow them to benefit from education alongside their normal peers. Farber & Royce (1977, p.45) claim that

> "the aim of research on mental retardation is the eventual elimination of those biological and social conditions that lead to social incompetence and intellectual disablement. It would seem that cognitive and social inadequacies often block the mentally retarded from filling useful social positions and from fully integrating themselves into society."

Early intervention for at risk infants and very young handicapped children has been a rapidly increasing area of social concern, evidenced by the proliferation of remedial programmes established, for example, in the United States since the early 1970's. (Comprehensive summaries of this literature can be located in Bronfenbrenner 1974, and Miller & Dyer, 1975). Interventions which are initiated early in life and which give emphasis to verbal interactions have been shown to be effective and to be sustained over a period of years. The literature suggests that the earlier the venture is embarked upon the more successful it is likely to be. In his review Bronfenbrenner states that early intervention is effective if it uses the child's family as the active agent for implementation of the programme.

"There is evidence from the review that within the family context, the most effective interventions are those that recognise the importance of and power of the mother-child interaction system". (Tjossem, 1976, p.20). Tjossem further stated that it is the support experienced by the parents which appears to be the most valuable approach for producing developmental gains in young, at risk children. Parents' "success in enhancing their child's development rests largely upon their motivation, involvement and acceptance of responsibility", p.24. It was for these reasons that Bronfenbrenner's (1979) conceptual framework of the ecological environment (conceived as a set of nested structures, ~~see figure 1~~) was employed in the present study as the theoretical model for an early intervention programme with D.S. infants. If the programme was to be effective it had to effect a transformation of the environment of the child and the persons in his/her milieu. The aim of such intervention was to effect changes in the "context" in which the family lived. These changes would in turn enable parents, siblings, family and community as a whole to perform the functions necessary for the child's development.

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Problems with the traditional approaches of conceptual framework (Brooks & Baumeister, 1977) type of intervention (McConkey, 1981) and evaluation (Zigler & Trickett, 1978) led to the present study adopting a strategy which encompassed both longitudinal and strong-life span approaches. The programme was developed, not in terms of a specific treatment

setting, but rather involving the "context" of the child and family. The content of the intervention was based on the normal progression of developmental sequence during the sensorimotor period as outlined in the cognitive-developmental approach of Piaget. Development was seen as helping the handicapped child acquire understanding (mental structure) as opposed to superficial knowing "about" or "of" something. It was apparent that the many curriculum packages available for mentally handicapped children (for example, Portage Scheme 1974, Bender & Valletutti 1976, 1977) consisted of specific tasks in broad developmental areas. This approach was criticised by McConkey (1981) (and supported by his research) as suffering from a "product" rather than a "process" approach, and in danger therefore of restricting the child's ability to generalise skills and acquire genuine understanding of objects and events in his/her world. This is of particular significance in the area of language development and is a recurring theme in the language intervention literature. (Schiefelbusch 1978).

EVALUATION OF THE STUDY

The study attempted to evaluate the success of the intervention programme with a small sample of children and a similar contrast group. Assessments included systematic ongoing evaluation of individual infant progress in conjunction with more objective procedures and contextal information. The samples of behaviour recorded took into

account the different settings in which the infants were involved. A number of different instruments were used in order to sample representative behaviours rather than those which are an artifact of experimental design. The intervention staff who were involved in the ongoing assessments of infant development were a continuing familiar contact for the child and his/her family, and could not be considered as strangers in a laboratory setting. Consideration of the above issues was an attempt to meet the requirements of ecological validity outlined by Bronfenbrenner (1979).

JUSTIFICATION FOR THE STUDY

The strategy for social and behavioural research outlined by Bowlby (1974, pp. 303-807) was considered relevant for the present study. He considered two principles of importance in this type of research. First "research projects should spring from opportunities to collaborate in the solution of actual social problems, and secondly that projects should be conducted by researchers committed in a professional role to assist those concerned". It is suggested that the present study takes account of both principles.

The intervention study attempted to highlight issues of theoretical and practical significance.

Firstly, the study had the potential to illuminate various developmental issues on the infancy stage in D.S. children (the study incorporated assessments of cognitive processes in the sensorimotor period).

Secondly, it utilized a theoretical model which was not divorced from real life and which allowed the researcher to observe the functioning of a social group over a period of time. Observations and assessments of how this group was affected by intervention procedures were made by intervention staff in a collaborative relationship. According to Bowlby (1974, p. 305) such an approach "encourages interdisciplinary thinking and promotes a responsible outlook in the researchers engaged."

Practically the study was justified on the following grounds:

(i) D.S. individuals can no longer be considered to be in the ineducable category. (Hayden & Haring, 1976)

(ii) As there is no cure at present for the genetic abnormality of D.S., and routine screening is not practical or advisable, such individuals will presumably continue to be part of society. Therefore such programmes which enable their families to develop the child's intellectual and social potential must be economically and morally defensible.

(iii) Prior to the setting up of this study, early intervention for D.S. infants and their families did not exist in Christchurch. It was considered important to offer them this opportunity to participate in a study which would be of practical assistance in the raising of a handicapped child at home.

The application of applied, task oriented research exacted a high price. It was difficult to control, measure or even identify the numerous variables influencing the real life situation of the research sample.

Although it was impossible in this study to control totally such variables it was useful and possible, by the inclusion of objective measures, to exercise a certain degree of control from which it was possible to draw useful conclusions. Where it was appropriate the present study has also used careful descriptions in order that the reader might follow as closely as possible what was happening to the infants in the sample.

The employment of the true experimental control group design was impossible for ethical reasons. Withholding services in order to obtain a matched, controlled sample could not be condoned within a city the size of Christchurch. It would be unlikely that families excluded from such a programme would not hear of it, and wish to participate when no other services for handicapped infants existed.

Any research involving families who may be disturbed by the unexpected birth of a handicapped child must be sensitively and respectfully conducted. In order to facilitate access to relevant data there must be mutual understanding between the researcher and those involved in the study.

As this type of study involved the expression of family feelings and motives (which may be in conflict following the birth of a handicapped child) it was important that the researcher assumed a non-judgemental and non-authoritarian role in order to establish a working relationship whereby the researcher had access to the type of data relevant for the study. Those who participated in the study had to feel assured that the data obtained would be treated with the utmost confidence. Also those families who made up the sample needed to perceive the research study as having immediate relevance in assisting them with real problems. The application of findings from a study will be more likely if the context outlined above is taken into account by the researcher.

It was considered inappropropriate to offer the intervention programme for merely the expediency of the present research topic. The researcher had a responsibility to ensure that appropriate programmes continued following the completion of the present study. Attention to early intervention in the short, rather than the continuing long

term focus serves only to confirm the established attitude of emphasis upon direct and immediate care of the child. "Research which ignores the effect of family, community and professional variables upon mother and child may support the current limited focus upon the diagnosis and treatment of the child and the mother-child dyad." (Schaefer 1976 p. 237). This involves a shift in focus from the need for early care and education primarily for the child to a much greater need for an enduring family and community environment which will counteract social stresses and provide support in the professions and institutions which influence handicapped children and their parents.

CONTENTS OF THE REPORT

The following chapter reviews the theoretical and research literature in the fields of ecological theory; the nature of the condition of D.S.; early intervention as it relates world wide to D.S. infants; the cognitive developmental approach to infancy and the role of parents in early education. The next chapter outlines the beliefs which underpin the early intervention programme and this is followed by Chapter IV which describes the running of and the content of the early intervention programme. The chapter which follows outlines the design, sample and resources used in the study followed by a chapter outlining and discussing the results obtained. The final chapter attempts to summarise the results and to discuss their present and future implications.

CHAPTER II

THEORETICAL AND RESEARCH BACKGROUND OF THE STUDY

INTRODUCTION

The first section of this chapter outlines the ecological model which was used in the design of the study.

The second section describes the condition of D.S. as it related to the subjects of the study.

The third section outlines recent research on early intervention with D.S. infants in the United States, United Kingdom and Australia.

The fourth section examines, Piaget's cognitive developmental approach to infancy as it related to the philosophy and content of the intervention programme used in the study.

The final sections examine the literature on the role of the environment in early intervention, the functions of parent-professional and parent-to-parent relationships as they affected the implementation of intervention procedures for handicapped infants.

Historical reviews of work in the general field of retardation, early intervention, D.S. and child development theory was not undertaken, as extensive writings in these areas are readily available in the literature.

THE ROLE OF ECOLOGICAL THEORY AND METHOD AS IT APPLIED TO THE PRESENT STUDY

"Ecological psychology is concerned with the interface between behaviour and the environment" (Scott, 1980, p. 281). It is the study of the behaviour and environment as an interdependent unit. It can be compared and contrasted with other behavioural sciences which are also described as naturalistic. Such fields as human ecology, social anthropology and ethology show certain similarities; these are summarised by Scott as follows:

"(i) a focus on the natural habitat as the site for research

(ii) the descriptive nature of the goals of the research

(iii) the use of descriptive methods such as direct observation to achieve these goals

(iv) taking care to interrupt or disturb the natural course of events as little as possible" p. 282.

In recent years many writers in the field of developmental psychology have advocated a greater use in research of more naturalistic methods in studies on human infants, (Brooks & Baumeister, 1977; McCall, 1977; Weiz, 1978; Kessel, 1979; Scott, 1980; Wohlwhill, 1973; Bronfenbrenner, 1974; Enright & Sutterfield, 1980). The experimental methodology dominant in psychology since 1950 has only limited ability to detect the dynamics of human interactions because of the restrictions that exist in laboratory settings. Typically the investigator limits the range of situations considered in his research by fixing many of the conditions under which the subject is observed. According to Cronbach (1975, p. 123) this means that "the interactions of any fixed aspect are theoretically concealed, being pulled into the main effect or into the interactions of other variables."

Bronfenbrenner (1974) stated that existing theoretical models in human development typically assume a two-person system only. The term "subject" will usually mean that the process taking place is unidirectional and that the research on the two-person system exists, and is treated as if it exists, in isolation from any other social context that could impinge on or encompass it. The contrast between the conditions that have traditionally prevailed in our experiments and those that exist in the child's everyday life situation points up the fact that much of our research has been "ecologically invalid". If a child is removed from his ~~visual~~ usual environment and put for a restricted period in another

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environment which is unfamiliar to him/her and does not contain persons, objects and experiences that are meaningful to him, then we gain only a limited picture of both the child and his environment.

According to Bronfenbrenner an ecological orientation must involve the interactions which occur between settings as well as those that occur within settings, e.g. the interaction between home and school, family and peer group. The adjacent, or encompassing, system will probably determine what can or cannot occur in the more immediate context.

McCall (1977) asserted that we cannot have a substantial science of naturalistic developmental processes until we alter a set of values that excludes questions that cannot be investigated experimentally. He further contends that we must stop believing that most longitudinal research is so beset with methodological problems as to be "hopelessly confounded" or beyond the financial and professional scope of most investigators. We must begin to use methods which are sensitive enough to represent human development in its true complexity (p. 333).

McCall is supported by Bronfenbrenner in his plea for science to be concerned with knowledge which is relevant to real children, growing up in real families, and in real neighbourhoods.

Ecological Validity

Weiz (1978, p. 1) argued that social relevance and scientific advance are potentially complementary objectives, "Our discipline is at its best in a state of creative tension between the pursuit of answers to contemporary social questions and the quest for firm scientific principles." The essence of Weiz's paper addressed itself to the problem which exists in ecological theory of transcontextual validity. He states that in developmental research evidence of transcontextual validity can consist of both empirical data and logical argument, such as we see in the cognitive-developmental tradition, e.g. Piagetian theory. To focus on this form of validity is to shift away from debates of whether laws are universal or not. Popper (1959) has noted "Again, we cannot search the whole world in order to make sure that nothing exists which the law forbids" (p. 70). In order to tap the merits of both the "Laboratory" and the "Field" methods of research Weiz (1978, p.8) argued for an integrated approach. He argues that the investigator should make decisions on the basis of practical, ethical and theoretical concerns rather than a blind loyalty to either "experimental control" or "ecological validity".

Bronfenbrenner (1977 p. 516) defines the concept of "ecological validity", as "the extent to which the environment experienced by the subjects in a scientific investigation has the properties it is supposed or assumed to have by the investigators." He argued that the relevant features of the

environment include not only its objective properties, but also the way in which such properties are perceived by the research subjects.

The Ecological Model

Because of its relevance to the present study, the ecological model of human development as outlined by Bronfenbrenner (1977) is summarised as follows. In defining the terms of reference for the model Bronfenbrenner (p. 514) described the ecology of human development as first,

> "the scientific study of the progressive mutual accommodation, throughout the life span between a growing human organism, and the changing immediate environments in which it lives, as this process is affected by relations obtaining within and between these immediate settings, as well as the larger social contexts, both formal and informal in which the settings are embedded."

Secondly, "The ecological environment is conceived topologically as a nested arrangement of structures, each contained within the next" (p. 514).

The Ecological Experiment

These nested structures, and the systems which operate within and between them are defined as the Microsystem, the Mesosystem, the Exosystem and the Macrosystem. In order

to investigate the operation of these structures empirically Bronfenbrenner (p. 517) proposed the following definition of an ecological experiment. It is

> an effort to investigate the progressive accommodation between the growing human organism and its environment through a systematic contrast between two or more environmental systems or their structural components, with a careful attempt to control other sources of influence either by random assignment (contrived experiment) or by matching (natural experiment).

In such ecological experiments methodological rigour is in no way sacrificed. Rather, he suggested that such a design (which does not have the usual objective of testing hypotheses) ensures "greater objectivity and more precise and theoretically significant inferences" (Bronfenbrenner, 1977, p. 517). In such an heuristic pursuit a design of this nature requires recognition of the social system actually operative in the research setting, and would of necessity involve all the persons present within the system, including the experimenter. These requirements must be met in any attempts to describe the totality of the functional social system in a particular setting.

The Ecological Perspective

Using the examples of both day care and pre-school environments Bronfenbrenner describes the limitations of the traditional research model. They are as follows:

1. The Empty Setting:

In his appraisal of the ten studies, nine defined the setting as the label attached to the group. Little or no information was given about the nature of the settings themselves, the activities which took place in settings, or the differences that existed between one setting (e.g. home) and another (pre-school). Those features of a setting that have been identified as significant for behaviour and development (motor activities, interpersonal structures and roles) are seldom identified and discussed.

2. Ecologically Restricted Outcome Measures:

Bronfenbrenner (1979) claims that traditional research has inappropriately relied heavily on the measurement of a very restricted range of variables, using primarily psychological tests or laboratory type measures. Such measurements may only reflect the child's reaction to a specific situation as he sees it, rather than indicate the child's general level of functioning. When gathering information, account should be taken of the many roles and relationships in which children become involved. For example with other children, with parents and other adults.

3. Fixation on the child:

According to Bronfenbrenner (1979) the traditional research model has been responsible for an almost exclusive focus of attention on the experimental subject, namely the child. He suggests rather, that much more emphasis should be placed on

the diversification of influences surrounding the child and account taken of the ways in which they are influenced by the setting containing the experimental subject. Bronfenbrenner cites the example of how parents are likely to be influenced by day care arrangements in their work, spare time activities and many other aspects of their lives. Most studies of the effects of day care have typically focussed on intellectual outcomes using intelligence tests and laboratory mesures of memory, concept formation and problem solving. Effects on the family are rarely mentioned (Bronfenbrenner 1979, p. 166).

The Use of the Ecological Model in Research

Although numerous studies are reported in the literature, the use of this model in the field of exceptionality, and in particular mental retardation is extremely limited. Brooks & Baumeister (1977) charged that the psychology of mental retardation was suffering from metatheoretical and methodological problems. The failure to consider the ecological aspects of the phenomenon of mental retardation suggested that much of the laboratory research published in the mental retardation literature suffered from the following limitations.

(a) independent variables which are highly restricted in range, form and kind.

(b) variables, both independent and dependent, that seem to be selected on the basis of convenience.

(c) the presence of natural interactions that might nullify or otherwise qualify generalisation beyond the laboratory.

(d) artificial and static stimuli that fail to capture the reciprocal interactions between the subjects' behaviour and their phenomenological world.
(e) preference on the part of the scientists for statistical significances irrespective of the magnitude of an effect or its practical or social significance (p. 410).

At least part of the problem seemed to revolve around the assumption made by many investigators that behaviour observed in everyday living may not in fact have a laboratory counterpart. A case in point was demonstrated by Belsky (1980) in a study on child maltreatment. Drawing heavily on Bronfenbrenner's theoretical contributions, Belsky conceptualised child maltreatment as a social-psychological phenomenon "multiply determined by forces at work in the individual (ontogenic development) and the family (the microsystem), as well as the community (exosystem) and the culture (macrosystem)" (p. 320). The emphasis was thus not so much on development per se, but rather with the contexts in which development occured. Belsky noted, however, that the model failed to take account of the individual differences that parents bring with them to the primary microsystem. In order to account for such differences Belsky employed Tinbergen's (1951) analysis of behavioural development (elaborated by Burgess, 1978) to integrate the child abuse data. The author concluded that the ecological framework she proposed permitted the prediction that when parents who have

inadequate experience in child care ("ontogenic development") have a temperamentally difficult, physically handicapped or premature infant ("the microsystem") maltreatment is likely to occur, if there are no friends or relatives to turn to for help ("the exosystem") (p. 320).

Garbarino & Crouter (1978) in an earlier study on child maltreatment drew also on Bronfenbrenner's model in a report which looked at the function of family support systems and linked maltreatment to the overall balance of stresses and supports in the neighbourhood context of families. According to the authors the likelihood of child maltreatment varied in direct relation to the "availability, adequacy, and use made of a family's supportive resources in the community" (p. 604). The authors concluded that an ecological approach can be usefully employed in the allocation of scarce resources to high risk areas.

THE STRONG LIFE-SPAN POSITION

The strong life span position asserts that early experience is a necessary but not sufficient condition for subsequent development. By way of contrast the early experience position is represented by such writers as Bloom (1964), and Hunt (1961, 1964). Evans (1975) describes their position as follows:

"1. Children are, by nature malleable and their growth and development can be modified extensively in a variety of directions.

2. The earlier one can effect a plausible intervention the better.

3. The manipulation of early experience will influence subsequent psychological functioning. This influence can be beneficial or unhelpful. In either case, a cumulative effect is involved.

4. The provision of qualitatively sound experience can modify or compensate for basic deficits in the child's environment. Such deficits define the basis on which remedial experiences can be built. Furthermore, since the school's scholastic emphasis demands certain basic learning capabilities, such capabilities must become the focus for early intervention.

5. Since a high level of capacity for symbolic (cognitive) activity is one of man's greatest strengths, children who manifest disorders in cognitive performance are failing to achieve their human potential. Thus, resources must be marshalled to prevent or remediate such disorders.

Growth of interest in the strong life span position comes mainly from the Clarkes, for example Clarke & Clarke 1972, 1976. They suggest that one of the greatest weaknesses of the early experience position is that it has traditionally used animal studies to support its hypotheses. Studies which have involved humans have failed to find conclusive evidence

of the irreversability of early developmental trauma (reviewed by Sameroff, 1975). Summarising his analysis of the relevant studies, Goldhaber (1979) believes that the long term significance of early experience depends upon the amount, intensity and duration of subsequent experiences. Only when an early experience initates a cumulative sequence would one expect long-term predictability.

According to Goldhaber, this re-evaluation of early experience by those who support the strong life span position is mainly the result of the coming together of the following areas of research and theory.

1. The continuing reinterpretation of Piaget
(Although Hunt saw Piaget's theory as supporting the early experience position it is equally arguable that it is in line with the strong life span position.)

2. The increasing usage of transactional developmental methodology
(Transactional models study interactions and inter-relationships between people and settings. Such models make it possible to show that it is continuity of developmental experience which is important in maintaining an early development occurrence.)

3. Re-emergence of stage based developmental models

(An alternative view to the linear quantitative model of the early experience position. The life-span approach acknowledges the discontinuous, qualitive structure-function relationships of developmental stages.)

4. The re-emergence of a strong life-span developmental psychology

5. The re-emergence of a sympathetic understanding of the child. (Belief that the child's early development is more resilient to stress than previously thought.)

The implications of the strong life position are summarised by Goldhaber (1979, p. 130) as follows:

> "(i) A greater appreciation of the distinction between species-specific and culture-specific development
>
> (ii) A greater emphasis on the importance of the continuity of educational experiences
>
> (iii) A role for early childhood educators which emphasises horizontal extension rather than vertical acceleration"

In essence, the strong life-span position and the ecological model represent branches of the same tree. The

ecological model is concerned with the spatial contextual aspects of the environmental/human interaction process, whereas the strong life-span position is concerned to show the equal importance of the successive stages of growth of the human organism throughout life. This position de-emphasises the relative importance of early experience as a predetermining factor in all subsequent development. The strong life-span position is summarised by Rutter:

> "The evidence is unequivocal that experiences at all ages have an impact. However, it may be said that the first few years do have a special importance for bond formation and social development" (1979, p. 28).

Ecological theory is concerned with specifying developmental processes in a way that will generalise beyond the observed contexts. In the forward to Bronfenbrenner's Ecology of Human Development (1979) Michael Cole analyses the position as "emphasising the crucial importance of studying the environments within which we behave if we are ever to break away from particularistic descriptions and contentless processes".

A worthwhile intervention programme should therefore:

(i) Follow the ecological model by incorporating as much as possible of the total context of the D.S. child.

(ii) Involve a longitudinal perspective of continuing programming and support.

(iii) Involve parents as both the focus, and the mediators of intervention procedures.

(iv) Incorporate a broad-based comprehensive developmental programme, emphasising the importance of "horizontal" and "process" learning, rather than the narrow perspective represented by the "vertical" and "product centered" approach.

(v) Use the systematic measurement of the environment to provide information about the setting.

(vi) Employ ecologically valid outsome measures of child behaviour.

CHARACTERISTICS OF DOWN'S SYNDROME (D.S.)

Incidence of D.S.

It was suggested by Gibson (1978) that in the U.S.A. alone, the maintenance and treatment of D.S. commanded between one and two thousand million dollars annually and the condition represented over one-third of the severely to moderately retarded population. The prevalence of the chromosome disorder continues to mount because medical science is better able to ensure the survival of the high-risk D.S. infant. Contrary to popular belief, the average maternal age is increasing in the United States and preventative measures

are still not being widely applied. D.S. occurs in the population with a relative frequency of 1 in 500 or 700 cases (Hirshorn, 1973; Thompson & Thompson 1973). However the incidence increases dramatically with the age of the mother. The incidence for a woman under 30 years is 1 in 1,500, and for a woman past 45 years 1 in 65 (Smith & Wilson, 1973). It is thought that there are neither ethnic differences (Kashgarian & Rendtorff, 1969) nor sex differences (Thompson & Thompson, 1973). Only one study of the New Zealand population has been carried out. This survey of 972 cytogenetically examined cases was investigated by Gardner et al (1973). They reported a marked decrease in the proportion of the D.S. cases born to mothers in the 30+ age group over the past 60 years. More recent figures are not available to provide information about D.S. and maternal age (N.Z. Department of Statistics 1981) in the general population. Johnston, Speed & Evans (1976) estimate that approximately nine per cent of all retarded individuals have D.S.

Historically, Langdon-Down (1866) can be first credited with the identification of what he called "mongolian idiocy". He was influenced by contemporary scientific thought, which was dominated at the time by Darwin's work on evolution. Following Langdon-Down's description of the condition, patients in the succeeding decades were classified and institutionalised from an early age. From this period until the early 1960's a large literature amassed about D.S. children. It was however, a literature about what happens to

a small infant who is separated from his parents, placed in an institution, and neglected in affective, cognitive and general medical care and attention (Gibson 1978). Traditionally D.S. became synonymous with severe retardation.

The discovery by La Jeune, Gautier & Turpin, in 1959 of the chromosomal aberrations in the cells of D.S. cases began a new period in the diagnosis of D.S. and in research methods which culminated in the development of amniocentesis techniques for prevention of D.S. births. D.S. is now known to be comprised of chromosome abnormalities, the most common form of which is trisomy 21 involving a complete extra 21st chromosome. Other forms include translocation, where part of the extra 21st chromosome is attached to another chromosome, and mosaicism, where the patient will have one normal cell line and one abnormal cell line with an extra 21st chromosome. In both mosaicism and translocation types of D.S. it is possible that the father may be implicated as a carrier of the resultant chromosome aberration, a diagnosis only achieved by detailed chromosomal studies. Until recently it was thought that the karyotype trisomy 21 was a disorder related specifically to the female ova. However, recent research involving sophisticated techniques with ultra violet light reports the male sperm as being defective in 40% of cases of trisomy 21 where the females and males were in the older age group (Abroms & Bennett, 1980).

Physical Characteristics of D.S.

Individuals with D.S. usually display phenotypic similarity in physical characteristics and growth patterns, which usually allows a clinical diagnosis of the condition prior to confirmation by cytogenetic techniques. Pre-term birth, with concomitant reduction in birth weight are typical of D.S. neonates, particularly males (Reisman, 1970). After birth the rate of growth remains slow and the following physical abnormalities are commonly observed: small nose, chin and ears, the latter often being immature in shape, the top rim of the ear is frequently folded over slightly, and placed irregularly on the head. These infants are usually short in stature and have shortened arms, legs, fingers and toes. The back of the head may appear somewhat flattened and the overall size of the head tends to be smaller, with the neck shorter than average. The fontanels may be large and later to close than in normal infants. The face appears flat, the bridge of the nose low with resultant reduction in size of nasal passages. The eyes tend to slant upwards in oriental fashion and there may be small folds of skin at the inside corners of the eyes known as "epicanthal folds". The outer portion of the eye may be speckled with lightly coloured spots called "Brushfield Spots". The mouth is small, so that the tongue appears large and often fissured, the palate may be short or steeple-shaped in structure which makes the accommodation of the tongue within the mouth somewhat difficult. Eruption of teeth is usually delayed and rarely occurs before ten months and frequently as late as three

years. The teeth are usually small and may be irregular or absent in the gums. The hands of the D.S. infant frequently have a single crease on the upper palm instead of the more usual two and the fifth finger may be somewhat short and have only a single crease on it, the tip of which may curve inwards toward the other fingers. The feet often have a characteristic gap between the first and second toes with a corresponding crease on the sole of the foot. Skin is frequently dry and mottled and unless particular care is taken may chap and crack easily, particularly around the mouth and lips. Congenital abnormalities of the heart are as high as 40% in children with D.S. (Smith & Wilson, 1973). They noted that in about half of these cases the severity of the defect would lead to an early death, while some less severe defects might improve with age or respond to medical or surgical remedies. Occasionally more serious health problems would occur in conjunction with the condition of D.S. (Smith & Wilson, 1973). Such problems are as follows:

(1) Susceptibility to infections of the lungs or intestine. Obstructions to the stomach or bowel caused by congenital abnormality, or umbilical hernia. Such problems occur in approximately one third of all cases.

(2) Eye problems including squints, errors of refraction, nystagmus and cataracts are relatively common.

(3) Leukaemia occurs in about 1% of D.S. children. The disease is usually recognised before three years. Because of its acuteness it is usually fatal.

(4) 1% of D.S. children will be at risk for cleft lip and palate, and club feet.

Discussions of abnormalities of hearing are rare in the literature. Smith & Wilson (1973) make no mention of congenital or functional difficulties of hearing in their otherwise comprehensive description of the condition of D.S.

Perhaps the most overriding clinical characteristic of D.S. for which there appears to be no exact measure is hypotonicity of muscle tone. These children are often described as "floppy" and "loose jointed". As with other clinical features of D.S., a range of tone will be observed in D.S. infants. Lack of muscle tone will inevitably delay the acquisition of physical milestones (Penrose & Smith, 1966).

Intellectual and Social Characteristics of D.S.

Perhaps the descriptive area most fraught with difficulty is that of intelligence levels in D.S. individuals. A number of researchers (Fennell, 1904; Sherlock & Donkin, 1911; Faconi, 1939; Oster, 1953; Donaldson, 1961;) have investigated the relationship of physical stigmata or cytogenetic category to intellectual status. According to a review by Gibson (1978), these earlier studies were unreliable because of inadequate methodology and inappropriate assumptions. The intention of the later studies of Bender (1966) and Baumeister & Williams (1967) was to match pathologic effects with the maturational timing of the various body systems in embryo, and these in turn with cytogenetic abnormality.

Particular difficulty in the aforementioned area arises with the presence of mosaicism and the resultant frequency of affected cells in the CA/IQ interaction. Significant intellectual variation with the percentage of mosaicism was first suggested by Zellweger & Abbo (1963) and later supported by Shipe, Vandenberg & Williams (1968) who found that when over 50% normal cells are evident, intelligence level is only mildly retarded or better. Against this evidence of the intellectual superiority of children with less than 50% mosaicism are studies by Rosencrans (1971) Clarke, Edwards & Smallpiece (1961) Kohn, Taysi, Atkins, Mellman (1970) who found no statistically reliable relationship.

Limitation in intellectual functioning is the most common delineating factor in D.S. In a review of this area Kopp & Parmelee (1979) summarised the recent research evidence from Smith & Wilson (1973) and Koch & de la Cruz (1975) as indicating an I.Q. range of between 20 and 70. Rosencrans (1971) found evidence of an occasional child in the 80's. However, Connolly (1978) suggested that the abilities of D.S. children were not as limited as had been previously suggested. Examination of his sample showed that a number of D.S. individuals had evidence of severe cerebral insult proving that a number of cases would always fall into the low I.Q. range. Kopp & Parmelee (1979) noted that, in general, language and the conceptualisation skills required for abstraction were most impaired, while skills related to

accomplishment of simple tasks, rote skills and non complex language were less impaired. This finding was supported by Cornwell (1974) and Lennenberg, Nichols & Rosenberger (1962).

The intellectual potential of D.S. children continues to be an unresolved issue as does the developmental declines in the measured I.Q. of these children. The whole question of low probability of predicting accurately the intelligence of a child from infant to child status (McCall Hogarty & Hurlburt 1972) needs to be looked at as a reason why D.S. children exhibit a continuing decline in scores which becomes very apparent in middle childhood. Such declines have been attributed by Kopp & Parmelee (1979) to:

(i) the inability of D.S. children to keep pace with the rapid conceptual growth of middle childhood
(ii) poor environmental conditions
(iii) dissimilarity of skills measured during infancy and childhood
(iv) test artifact
(v) biological deterioration

Kopp & Parmelee (1979) noted that there was no evidence as yet to support any single factor or cluster of conditions. It has been suggested that declines begin in the second half of the first year and studies by Carr (1975) and Dicks - Mireaux (1972) support this contention. Although there is evidence to support the belief of early decline, no theoretical or experimental evidence has yet been advanced for the conditions which underlie this regression.

Considerable work has been done on the perceptual, attending and memory processes of D.S. infants. An extensive review of this research has been presented by Kopp & Parmelee (1979). They noted the work of Miranda & Fantz (1973), Fantz Fagan & Miranda (1975) who found greater differences with increasing age between D.S. and normal infants in the limits on the complexity of information and processing achieved by the D.S. infants. Further work by Sroufe and his associates (Cicchetti & Sroufe, 1976; Sroufe & Waters, 1976; Sroufe, 1977) has contributed impressive insights into the ways in which D.S. infants handle information, in particular the relationship of affect and cognition in early life. Using a longitudinal study (4 months to 18 months) of D.S. and normal infants they observed a delay of several months in affective expression. However, the sequence of development found in normal infants was exactly replicated in the D.S. sample. They also noted a lesser range of affective expression in the D.S. sample. For example, smiles were more difficult to elicit and laughter as a response to stimuli less evident. They hypothesised that laughter required a longer time for processing information and thus a build up of the tension required for laughter did not occur. Interestingly, the authors also found a clear positive relationship between signs of affective expression and cognitive development. Infants responding to more complex sound and visual affective stimuli scored higher on the Bayley Mental Scale and the Uzgriris & Hunt Scales.

The social image of D.S. children is most definitely in transition. Traditionally the stereotype was one of a docile and socially suggestable youngster. The implication of this was that specific social behaviours for the D.S. child are inherent and have little to do with learning, or affective or intellectual potential. Modern observers contend that the social stereotype of D.S. children is not true and the child's social responses are more likely to be a product of "stereotype projection, compensating drives, particular neurological deficits, or contextual factors." (Gibson, 1978). Butterfield (1961) noted that motivational and situational variables have a good deal to do with the quality of socialisation in D.S. A study by Cullen, Cronk, Peuschel, Schnell & Reed (1981) examined the potential influence of sex, cardiac status, muscle tone and parental competence on Vineland Scores. The results revealed that young D.S. children attained significantly higher scores on Vineland and feeding milestones if they had 'good' muscle tone, minor congenital heart disease and if their parents guided them through an appropriate programme. While research has been undertaken in the area of social competence with these children, Gibson (1978) suggested that there are too many exceptions and important sources of individual variations to permit comfortable conclusions.

INTERVENTION STUDIES WITH D.S. INFANTS

Introduction

According to Tjossem (1976) "Motivation and support for the development of early approaches to intervention come from several sources. Fundamental to this development is a growing appreciation of the remarkable plasticity of the central nervous system" (p. 3). Lipton (1976) argues that the brain, as a living organ, is plastic and undergoes biological change with experiences that result in learning and memory. Thus learning involves changes not only in behaviour but also in the structure, function and composition of the neuron. Additional support for this view is found in the growing body of research on the effects of early stimulation on developing animals and humans.

Bronfenbrenner has claimed that one cannot understand what is happening to a child in isolation from the family and social context in which the child lives (Bronfenbrenner, 1979). The child's development is a function of all those settings in which the child participates. It follows from Bronfenbrenner's position that an intervention programme designed to alter the developmental progress of handicapped children must be understood as operating in the context of family and social systems. This suggests that one of the critical differences between intervention programmes is likely to be the extent to which they involve, or attempt to influence the family and social settings of the child.

In the following review of early intervention studies with D.S. children, the studies have been classified on the basis of the social setting and according to the degree of involvement of parents as well as the child. Three types of family involvement have been identified:

(i) Those which focused primarily on the parent.
(ii) Those which focused primarily on the child.
(iii) Those which focused on both the parent and the child.

In addition, four types of social setting were evident in the studies. These were:

(i) Centre or clinic based
(ii) Home based
(iii) Institution based
(iv) Centre and home based

A further distinction can be drawn between those intervention studies which involved intervening for a short period of time and on a small scale on one dimension of deficit (e.g. drug therapy intervention, Coleman, 1973) and those studies which had a broader perspective and extended over a period of years (e.g. the University of Washington Programme, Hayden and Dmitriev, 1975).

The early intervention studies reviewed in this section have been classified on the basis of the above distinctions in

TABLE 2:I

Focus of Intervention Programmes with D.S. Children

	PARENT	PARENT/CHILD	CHILD
CENTRE	Sinson (1977) Crowe (1975) Bidder, Bryant and Gray (1975)	Ludlow & Allan (1979) Pieterse (1976, 1977) Denhoff & Hyman (1974) Hayden and Dmitriev (1975) Connolly and Russell (1976, 1980)	Coleman (1973) Zausmer et al (1972) Airakson (1974)
CENTRE AND HOME BASED		Clunies-Ross (1979) Tein (1977) Piper and Pless (1980)	
HOME		Hanson & Schwarz (1978) Rynders & Horrobin (1980) Brinkworth (1973) Cunningham (1974) Sandow and Clark (1978)	
INSTITUTION			Aronson & Fallstrom (1977) Kugel (1970)

Table 2:1. The New Zealand studies have been kept separate because of their special relationship to the present study.

PARENT-CHILD CENTRE-BASED PROGRAMMES:

The programmes described in this section located the focus of the interventions for the D.S. child and the guidance and support given to the parents at a centre or clinic. These centres were usually attached to a large university or hospital where parents were required to bring their children on a regular basis, usually weekly (Hayden and Dmitriev, 1975; Hayden and Haring, 1977).

The University of Washington Programme

In 1971 a special service programme for D.S. children was established at the Model Preschool Centre for the Handicapped at the University of Washington. By 1976 it had expanded to serve over 50 home reared D.S. children aged between birth and 6 1/2 years. The goal of the programme was to determine the extent to which children with D.S. could be trained for more active participation in society.

The programme was grouped around five ages and competency levels : Infant (5 weeks to 18 months), Early Pre-School (18 months to 3 years), Advanced Pre-School (3 years to 4 1/2 years), Kindergarten (4 1/2 years to 6 years) and Primary (6 years onwards).

Subjects: Unfortunately the authors did not state the criteria for admission to the programme. No mention was made of the health status of the infants or the socio-economic status of the families. Two other groups of D.S. children were studied for comparison: first, those who did not attend the model pre-school centre, but were enrolled in public school; and secondly, children who were not enrolled in the model pre-school or primary programme but who were enrolled in other programmes in Washington State. Although case history data was collected on all groups, current developmental status was only collected on those children enrolled in the model pre-school programme.

Organisation and Content of the Programmes: The Infant Learning Programme met once a week for 30 minutes. One or both parents received individual training in early sensorimotor development. Motor exercises such as head lifting and turning were encouraged and techniques were demonstrated to parents. The motor items chosen paralleled those of the Denver and Gesell Infant Schedules. Skills were taught in small steps using verbal command and physical guidance. Reinforcers included the generous use of social praise, the application of error free graduations of task complexity and fading techniques. Weekly assessments on the D.S.P.I. (Downs Syndrome Performance Inventory) were made on each child. These were analysed quarterly and were used to monitor the programme's effectiveness.

The Early and Advanced Pre-School Programmes were attended by children four days a week for 1.5 or 2 hour sessions. They emphasised early self-help skills (e.g. dressing and washing); work with manipulative materials (e.g. crayons, paste, paper, blocks and puzzles); social and motor skills (e.g doll play); concept and attending skills (e.g. pointing to pictures and matching objects); language development (e.g. storytime and snack time); and gross motor development (e.g. walking, pulling, climbing and swinging).

Results and Evaluation: All infants in the Infant Learning Programme (14) who were assessed on the Gesell Behaviour Inventory (between 3 and 18 months) showed a mean difference of one month between their chronological age and mental age scores. The infants were also meeting and maintaining the developmental objectives on the D.S.P.I. Inventory. After one year the relationship between developmental level and age was analysed for all model pre-school children and graduates, and a contrast group. Although the results indicated that both groups of children continued to grow beyond the pre-school years, those who did not attend the intervention programme levelled off at 61% of normal development (D.S.P.I.), whereas intervention subjects levelled of at 95% of normal development.

Results also showed that those children who began intervention earliest maintained a higher developmental status than those children who began later. In addition, those

children who began intervention with the lowest developmental status made the greatest gains.

Parent Involvement: Parents were involved in all levels of the Intervention Programme. They were trained to use at home many of the exercises and instructional techniques used at the centre. Parents were rostered to work in the classroom and to attend staff meetings on the days they were present. Parents of D.S. infants were encouraged to stay with their children during their time at the centre. Parents' activities included meeting with students, talking to new mothers of D.S. babies, and writing for national educational journals. Once every quarter parents gathered to discuss problems and to share experiences. No evaluation was carried out of parent-infant interaction, nor of parents' abilities to act as teachers of their children. Counselling and support of parents (formal and informal) was not referred to as an important element in this programme, although new mothers were visited by other parents. The responsibilities of the programme staff were not described and home visiting does not appear to have been part of the programme. No mention was made of medical and social support systems.

Summary: This study presented both norm referenced and continuous assessment data which indicated substantial developmental progress in a group of D.S. infants over a period of years. Much emphasis was placed on the structured teaching of skills according to the Precision Teaching model. Parents were considered to be an important part of the

intervention programme and they were closely involved with their children's educational programmes.

The Kent Study

The next study to be reviewed in this section (Ludlow & Allan, 1970) was also longitudinal in design but involved three comparison groups of children in order to evaluate the outcomes of intervention.

Subjects and Procedure: All parents of D.S. children born in Kent, England, between 1960 and 1969 were given an opportunity to participate. Of the 150 requests, 144 agreed to participate. The children were divided into three groups. Group A consisted of children whose parents were given counselling and attended a developmental clinic or nursery school for a minimum of two years before the child's fifth birthday. This group therefore received both counselling and developmental stimulation. Group B consisted of children living at home who did not attend special facilities and whose parents did not receive counselling. Group C consisted of children who had been placed in residential care before their second birthday.

The intervention for Group A required each mother to attend the developmental clinic twice weekly. On joining the group the mother and leader were advised by the doctor on the needs of the child and targets for development were set accordingly. Mother's attendance at the group was considered

essential and she was encouraged to continue stimulating her child at home. The clinic was for children with all types of handicap and was run along play group lines by a qualified nurse or teacher. Voluntary helpers including teachers, physiotherapists, nurses and occupational therapists helped with individual activities. At the end of the session all mothers met in another room to discuss and share their various problems. Further meetings with doctors and other co-opted experts were held at intervals during the year.

The authors did not indicate the type of assessment used during the developmental clinic, the nature of "targets" set for behaviour, nor the nature of the counselling process.

Results: Groups A and B children were assessed on the Griffiths Scales and the Revised Stanford-Binet. Group C children had rarely been assessed early in development and were often not able to score on the Revised Stanford-Binet at the end of the study.

The results did not show a relationship between family background variables (such as family size) and the developmental quotients on the Griffiths Scale. Results on the General, Personal-Social and Speech Quotients of the Griffiths Scales indicated that the differences between Groups A and B and A and C were highly significant (X^2 = 12.13 and 14.1. $p < 0.05$). The difference between Groups B and C was not significant ($p > 0.05$), but the difference between the home-reared (i.e. A + B) and the institutionalised children

(C) was significant ($X^2 = 6.8$, $p < 0.01$).

The Revised Stanford Binet results (obtained in the 4th and 5th years) showed that the average IQ scores for Group A were 55.3 and those for Group B were 43.0.

The General Development Quotient (Griffiths Scales) measured over a ten year period showed a decline in all groups, (vid. Table 2). Group B children showed no further decline after five years. The authors suggested that this could have indicated that this group was not operating at full potential in the earlier years. Group C showed a rapid decline throughout the ten year period. The assessment of Group C children was more difficult and not as complete as for Groups A & B. The children with the highest scores in Group C came from smaller, more personal homes.

Table 2:2 Decline in Griffiths and R.S.B. Scores

Griffiths Quotients

Group	A.	B.	C.
year 1	79.8	69.4	68.2
year 5	54.2	44.4	38.1
year 10	48.9	42.6	25.1

Stanford-Binet Quotients

year 5	55.3	43.0	43.0
year 10	49.1	43.9	37.7

School placement at five and ten years indicated that a considerably greater number of children in Group A (40%) than from Group B (20%) were placed in normal or E.S.N. Schools.

The authors suggested that their study was closely related to a study by de Coriat, Theslenco and Wakman (1968) in which a similar method and structure had achieved similar results. At five years the median I.Q. of the stimulated group was 65.1, and the untreated group 49.1. The differences between the groups studied by de Coriat et al. were also evident at the beginning of the study.

Parent Involvement: No evaluation was made of the parents' involvement in intervention, although the authors reported that changes in parental attitudes were frequently reported in replies to a questionnaire on the upbringing of children.

Unfortunately no information was given by the authors on the use made of additional support systems (medical or social), on visits to the home, provision of equipment, or advice to parents on behavioural management.

A Short Term Centre Based Study (Connolly & Russell, 1976)

The results of the previous two studies indicated the value of long-term intervention procedures for home reared D.S. children. The study reported by Connolly & Russell (1976, 1980) also involved a centre based programme but lasted for a significantly shorter time.

Parents and children attended a centre where guidance in sensorimotor training was given by the staff. In addition group meetings were held for parents to discuss their problems.

The progress of the 40 D.S. infants in the programme was compared with available data on other D.S. children using the Gesell norms (Fischler, Share and Koch, 1964). Gross motor milestones in the intervention group were significantly ahead of those for the comparison group. For example "creeps" occurred at 14.0 months in the intervention group and at 17.3 months in the comparison group. The authors claimed that similar results were obtained for fine motor, feeding and social skills, although no comparison data was provided.

The authors also claim that the developmental progress of children who had begun intervention before six months of age was ahead of those who began after six months of age. It appears from this study that a short-term intervention can be successful and that earlier intervention (before six months) is more successful than later intervention. However, lack of specific information makes it difficult to identify features of the programme that might have been responsible for its success.

The Macquarie Programme (Pieterse, 1976)

Pieterse (1976, 1977) also described a short-term early intervention programme for D.S. children which began at Macquarie University, Sydney in 1975. Like the

Washington programme, the Macquarie Centre began with young infants (four months), incorporated behaviour modification principles and used a continuous data-based system for assessement of the children's progress. Only those children with Trisomy 21 were eligible for admission.

The Denver Developmental Screening Test was used to identify the areas of developmental delay for the teacher and parent. Bi-monthly assessment involved the Down's Syndrome Performance Inventory (D.S.P.I.)

Structure and Content: Each child was taught on a one to one basis. Infants up to 18 months of age came to the centre once a week where they were assessed and their mothers were given instructions to enable them to reach programme goals for their child. Children from 18 months to five years attended the centre three to four days a week for two hourly sessions. Parents did not necessarily attend those sessions.

Behavioural goals were based on normal sequential development which was broken down into smaller steps. No information was given about the parent, social or medical components in the programme.

Evaluation: Evaluative data was presented on six children for a four month period (Table 2:3).

Table 2:3 Percentage of 18 Month Tasks Passed

	Gross Motor	Fine Motor	Language	Personal/ Social
Initial Test	32%	24%	27	37
Four months later	66%	45%	46	64

The results indicate that the children made a consistent improvement between their initial assessment and later testing. Fine motor and language areas were slower, which was consistent with other reported findings. The data presented, although positive, is limited in scope and covers only a short period of intervention (four months).

Denhoff and Hyman (1974) described a comprehensive, longitudinal therapeutic educational programme designed to meet the needs of very young children from birth to three years. The programme included a group of D.S. infants. A set of comprehensive assessment procedures were described but unfortunately no results were reported.

Summary of Centre Based Studies

Of the studies described in this section that of Ludlow and Allan provides the clearest evidence that a programme for

home-reared D.S. children who attend a developmental clinic and whose parents receive counselling can be very effective. Although the treated children's I.Q.s did decline with age, they began higher and did not decline as rapidly as the untreated children. Possibly as a consequence more of the treated children were able to attend normal school. Unfortunately there is no way of knowing which aspects of the programme were responsible for the success of the home-reared, treated children. There is some evidence in this study, supported by the studies of Connolly and Russell and Hayden and Haring, that intervention should begin early before the usual decline in development sets in. The studies described by Hayden and Dmitriev and Pieterse provided evidence that D.S. infants can be taught using precision teaching methods. Developmental profiles showed continuous improvement in all areas of development with some approaching normal expectation. It is difficult to make direct comparisons of the relative effectiveness of the programmes reported in this section because they used different measures of progress and different criteria of success.

PARENT-CENTRED INTERVENTION PROGRAMMES : (CENTRE BASED)

The studies described in this section focused primarily on the parent as the agent for change in the child. Generally parents were required to regularly attend a centre for group discussions. The D.S. infant may or may not have been involved in an associated group.

Behaviour Modification Training

A study by Bidder, Bryant and Gray (1975) was designed to measure the effectiveness of instructing mothers in behaviour modification techniques.

Subjects: Sixteen mothers of D.S. children aged between 12 and 33 months were divided into two groups matched for age, sex and mental age (Griffiths scores).

Structure and Content: The treatment group mothers were given six months specific training in behaviour modification techniques (12 sessions). Each session contained two parts.

(i) 90 minutes was spent on a training programme covering language development, manipulative activities and self-help skills. Activities were individually designed and advanced in small steps based on recent achievements.

(ii) 45 minutes was spent in a discussion group where mothers shared and expressed their family and personal problems in relation to their D.S. child.

Mothers kept daily records of their child's progress at home and were instructed to carry out ten minute training sessions three times per day.

Evaluation: Using the Griffiths Scale the two groups of children were compared for mental age before and after the six month treatment programme. Mean mental ages at the beginning of study were 16.6 for the experimental group and 14.8 for the control group. The treatment group advanced at a mean rate of 6.56 months while the control group advanced at a mean rate of 2.56 months. The differences between the treatment and control groups were statistically significant on the performance scale but not on the personal-social or locomotion scales.

In addition, the authors reported (from a parent questionnaire) that the treatment group mothers experienced greater confidence and morale and fewer feelings of inadequacy as a result of the training they had received.

The study did provide evidence for the effectiveness of training mothers as a means of producing developmental gains in the D.S. Children. Unfortunately the intervention was limited to six months and the stability of these gains over time is not known. It is unfortunate too that only the Griffiths Scale was used to measure the effects of the intervention. No information was provided on general developmental progress nor on the nature of the home environment.

Studies Involving Parent Support

Two further studies which focused primarily on the parents of D.S. children were those by Sinson (1977, 1978) and

Crowe (1975). Sinson designed an intervention programme solely in terms of parent-to-parent contact and support. The support group involved seven mothers whose children were aged two months to three years. The group met at a centre for the handicapped and the staff attached to the centre were on hand to give advice with the children's developmental progress. Parents were given copies of Gunsburg P/P.A.C. and Mary Sheridan norms. Although the idea of a support group recognises the unique role of the parent as educator and brings together people with similar problems, the lack of evaluative data makes evaluation of the programme impossible.

Crowe (1975) also reported the importance of providing the parents of D.S. children with support from one another and guidance from professionals in the field of mental retardation. Unfortunately Crowe's study does not provide evaluative data.

Summary of Parent-Centred Programmes

Of the three studies described in this section only that of Bidder et al (1975) provided any evidence of the effectiveness of using mothers as the agent of intervention. None of the studies measured the effectiveness of the parent, or the nature of the parent-child relationship in the intervention process. Although each of the authors reported changes in maternal attitudes and behaviour, no attempt was made to evaluate how these changes affected the intervention programme.

DRUG INTERVENTION STUDIES

Although not strictly intervention programmes of the kind described in the rest of this review, drug based programmes are a form of child centred centre-based intervention which cannot be overlooked. "Chemical methods for the control of difficult behaviours, or the enhancement of psychomotor or sensory facility for D.S., have been consistently popular because such approaches promise cure, are mystical and require little effort" (Gibson 1978, p. 307).

Physical treatments which have attracted attention during the last decade include thyroid therapies, the use of pituitary extract, the administration of glutamic acid and its salts, various vitamin therapies, siccacell therapy, and the administration of 5 - hydroxytryptophan (5 - H.T.P.).

Studies involving the latter, (5 - H.T.P.), have been selected for this review as the one chemical management of D.S. children which has aroused the most recent interest amongst parents and professionals. Details of studies involving other chemical therapies can be found in Gibson (1978).

In one of the better evaluated studies, Coleman (1973) described the use of 5 - H.T.P. in a 3 year double blind study with 19 D.S. infants with trisomy 21. Nine children received 5 - H.T.P. continuously for 3 years and ten children received

a placebo. Analysis of the blood samples indicated elevated levels of the drug in treated patients.

Increased muscle tone was observed in newborns in the treated group in the first three months, but thereafter the scores were lower until no observable advantage was apparent at three years.

There was also no apparent positive effect on mental functioning. The developmental quotients obtained on the Bayley scales at 12 and 14 months from the treated group were significantly below normal.

Serious side effects were observed in those children receiving the drug. Infantile spasm occurred in 14%. Diarrhoea, hyperactivity and hypertension were also observed.

Similar results were reported by Araikson (1974) in Sweden, although no specific results are available.

Zausmer, Pueschel and Shea (1972) reported the use of 5 - H.T.P. in conjunction with instruction in motor and sensory stimulation and structured teaching and support for parents. Evaluation of developmental milestones using a double-blind design did not reveal any significant differences in favour of the group receiving 5 - H.T.P.

Summary of 5 - H.T.P. Studies: It seems that studies of the effect of 5 - H.T.P. have not shown advanced performance in

either sensory, motor or intellectual development in D.S. infants. The potential seriousness of the reported side effects of the drug constitutes a contraindication for continued experimental use.

INTERVENTION STUDIES WHICH INVOLVED BOTH HOME AND CENTRE

The studies reviewed in this section placed primary emphasis on home-based teaching in conjunction with centre-based teaching.

The Clunies-Ross Study

A typical study using this dual focus was that described by Clunies-Ross (1979). This study used precision teaching techniques and reported the progress of 40 D.S. infants involved in the programme for periods ranging between four months and two years. It involved:

(1) Centre-based teaching which took place two or three times per week for a total of six hours. This programme involved helping children attain a normal developmental sequence of language, social and self-care skills, cognitive, fine-perceptual motor and gross motor behaviours.

(2) A home programme which involved one parent from each family attending a ten week course in child development and management. Parents were also given written instructions with which to implement programmes at home. They were asked to record their child's progress and to discuss it with a staff

member each week. This home-based teaching was used to promote generalisation and consolidation of skills taught at the centre. Materials and equipment were provided for the parents.

Applied behaviour analysis and precision teaching techniques were used by the staff to implement the programme.

Results and Evaluation: The author reported continuous improvement in developmental status by all children in three successive intakes (1975, 1976, 1977). Children who began intervention earlier achieved a higher status as measured on the E.I.D.P. (Early Intervention Developmental Profile): (D'Eugenio and Rogers (1976)). After 12-24 months in intervention nine of the 29 children in the 1976 and 1977 intakes were at or above the norms for their chronological age in one or more areas of development. The areas of greatest gain were social, cognitive and fine-perceptual motor.

Although the programme involved the child's home, no evaluation was made of home background factors, mother-infant interactions or the parents' abilities to teach their D.S. children. Thus it is not possible to evaluate (from the information given) the relative contribution of the home and centre based programmes to the total effectiveness of the programme.

The Piper and Pless Study

In contrast with the study reported by Cluniés-Ross, another home and centre based study by Piper and Pless (1980) failed to demonstrate enhanced mental or social development in D.S. infants receiving intervention.

This study involved assigning 37 infants under 24 months of age to either a treatment or a non-treatment group. The 21 infants in the experimental group participated in a six month bi-weekly programme, and parents were issued with written instructions on home programming.

Evaluations: The mean development quotients (Griffiths Mental Development Scales) of both groups declined with age on all subscales over a six month period. The experimental group decreased less than the control group in two of the six subscales (hand and eye performance). For the other four subscales the control group's scores declined less than those of the experimental group. None of the differences was statistically significant. The total developmental quotient declined 7.33 points for the treatment group and 5.94 points for the contrast group.

The H.O.M.E. Scale was also administered to both groups to compare home backgrounds before treatment. Experimental subjects obtained significantly higher scores on the "provision of appropiate play materials" (H.O.M.E. Scale), but this clearly had no effect on the outcomes.

No details were given on cytogenetic status of the infants nor socio-economic status of the parents which might have explained the lack of treatment effect.

In response to criticism (du Verglas, Hamilton & Hanson, 1980) Piper and Pless have acknowledged that seasonal assignment to groups could have affected the comparison (D.S. children are more likely to have respiratory illness during the winter months). The short duration of the intervention (six months), and the failure of parents to learn and carry out the programme activities are also possible reasons for the lack of positive results.

The Tein Study

A further programme which combined both home and centre based teaching has been briefly described by Tein (1977). This study used parents who had been instructed in behaviour management techniques to teach their D.S. infants. The Denver and Gesell Developmental Schedules were used for establishing behavioural objectives for the children. The report unfortunately lacks any evaluative data on which to base a judgement of its effectiveness.

Summary of Home and Centre Based Studies

Several factors may have been responsible for the difference between the studies reported by Cluniess-Ross and Piper and Pless. Cluniess-Ross reported that the earlier the intervention, the greater the gain. Piper and Pless had children enter their programme up to 24 months of age. The

Clunies-Ross programme recorded near normal development from some children who had been in the programme for 12-14 months. The Piper and Pless programme lasted only six months. It is tempting to conclude that earlier intervention and a longer intervention programme are the critical variables, but it could well be differences in the programmes themselves which were responsible. Without data on the implementation of the programmes in the home and centre, it is not possible to tell.

SOLELY HOME-BASED INTERVENTION STUDIES

Four significant studies have been carried out in which the intervention programme was implemented entirely in the child's home.

A Home-based Precision Teaching Programme

Hanson and Schwarz (1978) described a study in which the longitudinal development of 12 D.S. infants in a home-based intervention programme was compared with established norms for D.S. and normal infants. No control group was established for ethical reasons.

The average age of the mothers was 27 years and the families came from a wide range of educational and occupational backgrounds.

Content and Structure: Home programming began between four weeks and six months of age and continued for 15 to 30 months. (Mean age of completion was 24.4 months). Parents were

visited weekly by a parent advisor who wrote step by step precision teaching programmes (ten trials per day) for parents to follow and evaluated the child's development against normal milestones. The advisor also gave advice on the child's physical environment and play skills.

The parents were closely involved with the programming and continuous evaluation of their children and the authors reported that, by the end of the programme, the parents were establishing goals, writing programmes and assessing their own children.

Evaluation: Comparisons with available developmental norms showed that the intervention subjects achieved skills consistently later than normals but much earlier than non-intervention D.S. children. For example, "sitting supported with head steady" occurs at three months for normal children and five months for untreated D.S. children. The children in this programme attained this milestone at an average age of 4.25 months. "Walking with support" is achieved at ten months for normal children, 20 months for untreated D.S. children, and was observed at 13 months in the study children.

No data from standardized developmental scales were obtained.

The Hester Adrian Research Centre Studies

The studies described below, (Cunningham, 1975; Cunningham and Berger, 1982; Berger and Cunningham, 1981), were carried out at the Hester Adrian Research Centre and were addressed to specific aspects of D.S. functioning rather than total development.

Cunningham (1975) investigated the development of visually directed reaching in D.S. infants. The author stressed the importance of these behaviours for the emergence of object-permanence through the exploration (grasping, releasing and manipulation) of objects. The aim of the study was to speed up the attainment of these critical behaviours.

Subjects: These included two groups of D.S. infants (the first a comparison group) aged between six and 12 weeks of age. Two-weekly video-tape recordings were made in the home from which categories of prehensory and visual behaviours were determined. The behaviours of the D.S. subjects were analysed within the chosen categories. The intervention group received intervention which aimed to promote those behaviours which were classified as critical from an analysis of the recordings. The authors did not specify the nature of the intervention process.

Evaluations: Six-weekly assessments of general development were made using the Bayley Scales and at 20 weeks detailed assessments of the emergence of object permanence were made.

The development of reaching in the first group was used as a basis for comparison of the effects of intervention on the second group. An interim report has indicated that the treatment group was developmentally in advance of a similar group assessed by Carr in 1960.

A second study involved a separate, but related, investigation into mother-child interactions (Cunningham 1974). The aim of this study was to compare the emergence of eye to eye contact and face to face interactions in D.S. and normal infants. Information was collected on how parents were told of the birth of the D.S. infant and the effect that it had upon them and their families. An interim report by Berger and Cunningham (1981) indicated quite different patterns of development in the D.S. children.

Project EDGE

Rynders and Horrobin (1980) have described a large home-based study which, unlike the previous studies, focused on the development of the whole child within the mother-child relationship.

Subjects: The programme employed an experimental/control design with 23 experimental families and 20 control families. Inclusion in the programme was selective. All children had to be trisomy 21 type, home-reared, with no major health problems. Family income had to be at least U.S.$6,000, maternal I.Q. greater than 90, with parents using English as a first language.

Procedure: The programme was based on problem solving sensorimotor activities which engaged the mother and child in focused, meaningful and affectionate behaviour. Guidelines based on normal developmental sequence were given to parents.

Evaluations: A comprehensive neurological assessment at 12 months and a test of concept-visualisation at 24 months both showed no differences between the groups. Assessment at 60 months on the Stanford-Binet and Bruninks-Oseretsky tests showed significant differences in I.Q. and the development of motor abilities in favour of the experimental group. However assessment of concept-visualisation and expressive language carried out at the same time revealed no differences.

It is not clear from the authors' description of the study how the intervention procedures were introduced to the parents, or by whom. It is also difficult to interpret the results because no actual data was presented for the measures which were used. For example, it was not possible to tell the level of I.Q. achieved at 60 months nor how advanced the motor scores were for the treatment group.

Brinkworth's Home Training Programme

The early work on D.S. infants by Brinkworth and Collins (1969) and Brinkworth (1973) is well known. Brinkworth and Collins (1969) wrote a manual for parents entitled "Home Training for the Mongol Child" (a later

publication by the authors was entitled "Improving Babies with Downs Syndrome"). The manual contained instructions for parents on bottle feeding, dietary supplements and care of the skin of the D.S. infants. For the infancy period guidelines were given on exercises for the body and early sensory training. Parents were encouraged to carry out the exercises for ten minutes each day.

Brinkworth and Collins (1973) have described a study carried out in Birmingham using two groups of D.S. infants. The experimental group comprised five infants and the control group twelve infants. The ages of the infants on admission to the study were not given, although it would appear they were about six weeks of age.

Procedure: The five infants in the treatment group were visited for four hours per week. Work sheets and copies of the parents' manual were given to participating families.

Evaluation: The Griffiths Developmental Scales were used for assessment at six months of age and gains in D.Q. were apparent (experimental group mean D.Q. = 101.8, and control group mean D.Q. = 75.0).

Following the six month assessment the control children were offered help similar to that given at an earlier age to the experimental children and the programme's staff discontinued visiting the parents of the experimental children.

Re-testing at one year showed a marked decline in D.Q. for the experimental group but not for the control group, (experimental group mean D.Q. = 81.07 and control group mean D.Q. = 75.0).

Although Brinkworth alludes to the importance of the early environment the evidence from this study does not necessarily support this view. The control group, given help after six months, maintained their six month level of performance on the Griffiths Scales while the treatment group declined significantly. The study lacked information on any counselling for parents, medical or social support services, how children were selected for the experimental group, socio-economic status of parents, cytogenetic analysis or sex of infants. There was also no indication as to how the parents used the manuals, or what teaching methods were employed to help children attain behaviours.

The University of Hull Home-based Programme

Sandow and Clarke (1978) described a programme of pre-school home intervention based at the University of Hull. It was designed to be a three year home-based programme with no clinical element.

Subjects: 32 pre-school, severely subnormal children aged between 18 months and three years four months. The group consisted of 11 D.S., eight severe cerebral palsy and 13 with

other diagnoses. The children were divided into two groups and matched for age, sex, I.Q., social class and to an extent, diagnosis. A control group was not used for ethical reasons.

Procedure: Intervention took place for a period of 20 months. The children in Group A were visited for two hours every two weeks. The children in Group B were visited for a similar period every two months.

The children were assessed using the Cattell Infant Scale, the Vineland Social Maturity Scale, and where appropriate, the Peabody Picture Vocabulary Test. Parents kept regular records at home on the Gunzburg (PPAC) and occasionally the Portage Project checklist.

Parental attitudes were sampled at the beginning and the completion of the programme by using a sentence completion form and a structured interview.

A behaviourally based remedial programme was devised to cover specific areas of deficit for individual children. For Group A this programme was closely supervised.

Results: The results of the study were apparently contradictory. Frequently visited children, after a period of initial superiority over infrequently visited children, showed deceleration in intellectual growth. The subgroups were not analysed separately and so it was not possible to ascertain the exact nature of the change in scores for the 11 D.S.

children.

The authors advanced the follcwing reasons for the apparently contradictory results of their study:

(i) The dynamics of visiting every two weeks were different from those of eight-weekly visits.

(ii) The degree of familiarity which occurs between the therapist and client during two-weekly visits encouraged dependency and lack of initiative, whereas the eight-weekly visits encouraged the parents to take responsibility and positive action to improve their own and their child's situation.

Unfortunately the study did not provide sufficient information for specific conclusions to be drawn about the nature of the home programme. The role played by the visiting therapist was not described and it was not clear whether the same person visited all families or whether [illegible] were involved. Although the authors made mention of the importance of home as opposed to clinic programmes as a way of meeting the needs of all social classes, there was no evidence of how significant parental socioeconomic status was in implementing the intervention procedures.

Summary of the Home-based Studies

All the studies reviewed in this section demonstrated that an effective programme of intervention can be established in the home using the mother or family as the primary agent of change. However, it is difficult to compare the relative effectiveness of the different types of programme because each of the studies used different criterion measures.

All programmes provided support for the mother in the form of frequent home visits by a professional, although the evidence obtained by Sandow & Clarke suggests that too close a dependence on professional support may have an adverse effect.

The study by Brinkworth showed that a brief intervention (six months) may be followed by a decline in the initial gains achieved. This is similar to the effect obtained in the centre based studies reviewed in the previous section. The two studies that continued for longer periods (Hanson & Schwarz, Project EDGE) showed consistent increases in performance, with one not showing a significant effect until 60 months of age.

Although all the programmes described in this section took place in the home using the parents to implement the intervention procedures, no study attempted to measure the dynamics of the home, the parent-child relationship or the parent-adviser-parent relationship or the effect these might have had on the success of the programme concerned.

INTERVENTION PROGRAMMES WHICH WERE INSTITUTION-BASED AND WHICH FOCUSED ON THE CHILD

The following programmes described intervention procedures within a hospital or institution setting. Such programmes focused primarily on the D.S. child and did not involve the natural families of the children concerned.

The Swedish Study

Intervention programmes within the hospital setting have been reported by Aronson and Fallstrom (1977) and by Kugel (1970). Aronson and Fallstrom (1977) described a controlled study of the immediate and long term effects of early systematic training of mentally retarded children.

Subjects: The participants were 16 D.S. children, aged between 21 and 69 months, living in a nursing home in Sweden. The children were divided into treatment and control groups and matched for age and sex.

Procedure: Each child in the experimental group received training of between 15 minutes and one hour, twice a week for 18 months (carried out by a junior psychologist). The focus of the training was to stimulate the development of sensory, natural body (e.g. eating, toilet training), mental (e.g. inferential ability, appreciation of colours and shapes), motor (e.g. gross and fine motor activity, balancing ability), memory (e.g. repeating numbers), emotional (e.g. control over

emotional, social (e.g. group of organized activities, living skills, running errands) and energy (e.g. concentration and attention) functioning.

Evaluations: Evaluations of the effectiveness of training involved five separate administrations of the Griffiths Scales. D.Q.'s at the beginning of the study were 39.4 for the experimental group and 40.5 for the control group. The trained children showed a mean gain of 10.5 months of development against 2.5 months growth for the control children. Greatest gains were made on the Locomotor and Eye and Hand subscales and the lowest gains were made on the Practical Reasoning and Hearing and Speech subscales.

A follow up evaluation 12 months later showed no significant difference between the two groups for the total test, although some individual scale differences remained. For example, with Hearing and Speech, the treatment group maintained a gain of 12.7 months as against 7.7 for the control group.

It is clear in this study that, for the 18 month period when the intervention programme took place, children who were provided with sensory motor and language stimulation showed a marked improvement on the Griffiths D.Q. scores. Unfortunately the study did not provide any detail on how the training took place.

Kugel's Study

A further study which attempted to modify the institutional environment was described by Kugel (1970). The subjects were seven D.S. children aged between four and 17 months and all were delayed in their development. Intervention took place over a period of 18 months.

Procedure: The programme attempted to provide three ingredients normally lacking in institutions:

(i) home-like atmosphere
(ii) a substitute mother for each child
(iii) continuous stimulation and physically strengthening activities for each child

The author described the programme of daily care as providing a broad base of environmental and community experience. The children were involved in activities such as visits and outings, trips to playgrounds and to normal play groups.

Evaluation: Six of the seven children improved over the period of intervention. By the end of the study most had achieved gross motor activity ratings appropriate to their C.A (when the study began only one of the four children who were over 12 months could sit alone). After six months in the programme six children could walk, run and climb. Fine motor skills were only slightly less developed than normals. The author reported that, following intervention, parents were

more willing to take their children home for visits. Subsequently all were placed in foster care outside the institutions.

Although this study did not employ a control group and evaluative data was sparse, the study does suggest the following implications:

(i) Hospital routines can be changed to be fully supportive of the development of young D.S. children.

(ii) Parent and community attitudes towards these children can be changed as their development more closely approximates that of non-institution children

Summary of Institution Programmes

Of the two studies reviewed in this section only that of Aronsen and Fallstrom provided any evidence from standardized tests of the effectiveness of the programme. Again, it was evident that progress achieved during the intervention had largely disappeared on follow-up 12 months later.

Although lacking standardized test data, the study by Kugel did describe important positive consequences of intervention for both the children and the community in which

they lived.

EARLY INTERVENTION PROGRAMMES IN NEW ZEALAND

Early Intervention programmes with D.S. infants in New Zealand are relatively recent. When the present study was begun no programmes were known to have started. However, the last five years have seen the emergence of three early intervention programmes in New Zealand. Of the three, "Project Path" at Waikato University was the only one designed specifically for D.S. infants. The other two were "Dawnstart" (Wellington) and Mangere Early Intervention Programme (Auckland). As there has been very little published material on the effectiveness of any of these programmes, (two have now ceased operation) a comparative evaluation of these and other early intervention programmes is necessarily limited.

"Project Path" (Mitchell, 1981).

This programme for D.S. infants was set up at the University of Waikato in 1978 and ended in 1981.

Subjects: Fourteen infants were enrolled in the programme (average age eight months at the time of enrolment).

Procedure: Parents attended the clinic with their children individually for a two hour visit, once a fortnight. Most families travelled long distances to attend the university clinic where structured data-based teaching took place. In addition some sessions were videotaped to aid in feedback to

[illegible] on the effectiveness of their own teaching skills. Staff included a physiotherapist and an additional person with skills in the educational/psychological area. Parents were given written "homework" activities to carry out with their infants.

Evaluations: Children's progress was monitored every three months using the Bayley scales. Results of five of the infants compared favourably with untreated controls from a Queensland study (Berry, Andrews and Gunn, unpublished).

A target level of 75% of the mental and motor age equivalents of average development on the Bayley scales was set. On the mental scale, the "Path" subjects' progress almost equated with the target level and was considerably greater than that of the untreated controls. On the motor scale the scores were closest to the target towards the end of the study although the scores were still considerably greater than those of the untreated controls.

A manual of activities (using behaviour modification techniques) was developed as a result of the programme.

Although the programme appears to have been effective, it did not involve anyone other than the child's immediate family, nor did it provide parent support or counselling on a regular basis.

It should also be noted that the programme was of short term duration (approximately 15 months) and did not involve continuing intervention for the children nor continuing support for their families. The number of children was small (14) and probably attracted only those families who were able to travel to attend the clinic.

The Dawnstart Project (Straton, 1977)

This programme for stimulating the development of developmentally delayed infants was begun at Massey University in 1975, using a weekly clinic approach. The programme then transferred, along with the author, to Wellington where it was funded by the Education Department's Psychological Service. The author described a teaching manual for motor, cognitive and language skills. No results have been published and it has not been possible to obtain any further information.

The project included a wide range of young, developmentally delayed children. Professional assistance was given in the areas of speech and physiotherapy. Parents were instructed on ways of stimulating development. No information is available on how this was achieved, nor on the breadth and content of the programme itself. Use was made of the Bayley scales.

The Mangere Early Intervention Programme (Painter, 1981)

This programme was described as a home-based service for pre-school, developmentally delayed children in the Auckland area. Some D.S. children were referred from birth;

others were referred as developmental problems developed. The content of the programme covered gross motor, fine motor, cognitive/pre-academic language and self-help skills. The programme was individualised to take account of each child and family situation.

Teaching took place in the child's home. A therapist visited regularly to set goals and teach parents skills for working with their children. Parents modelled the skills of the therapist and written instructions were left for parents to follow. Family support meetings were held regularly.

Assessement involved Bayley Scales, Stanford-Binet, Griffiths Development Scales, in addition to Portage and Washington developmental inventories. No published results are available.

Summary of New Zealand Studies

Of the three New Zealand studies on which information was available only one can be evaluated on the basis of evaluative data. The focus of this one programme was on parents as the agents of change. Although it was relatively short term and did not involve home visiting by professional staff it appears to have been effective for the small sample of children involved.

DISCUSSION AND CONCLUSIONS

The intervention studies with D.S. infants reviewed in this section are discussed first in relation to the setting or social context in which they took place and secondly in relation to the focus they employed.

One reason for classifying intervention studies by the setting in which they were carried out was to make it easier to identify any differences in the relative roles of parents and professionals and the effects this might have on the effectiveness of the programmes. However, as the review makes clear, direct comparisons between programmes are difficult because of the variety of outcome measures and the ways in which the results are reported. Some limited comparisons are possible between those studies that did use the same standardized developmental scales.

Studies Using the Griffiths Scales

Four of the studies reviewed made use of the Griffiths Scales. Of these, two were centre-based (Ludlow & Allan; Bidder, Bryant & Gray), two were home or home and centre-based (Piper & Pless; Brinkworth) and one was undertaken in an institution (Aronson and Fallstrom).

The two centre-based studies reported D.Q. gains of 12-14 points (Ludlow & Allan) and six points (Bidder, Bryant & Gray) although one reported a steady decline in scores over a later ten year period.

Of the two studies which involved the home Piper and Pless reported no difference in D.Q. between the treatment and control groups. This was, however, a short term intervention (six months) and no followup measures were reported. The other study in this group (Brinkworth) showed an initial advantage of 26.8 D.Q. points between the treatment and comparison groups but this declined to about six points a year after the study began. Again, however, the intervention lasted for only six months.

The institution-based intervention programme reported by Aronson and Fallstrom showed significant gains for the treatment group of 6-13 months on the different subscales over an 18 month period. One year later some of this gain had been lost but the treatment group was still significantly in advance of the contrast group. These gains appear to have been greater than those reported in the other studies, but note should be taken of the fact that the children apparently began the programme with significantly lower scores than those reported in other studies.

In conclusion, an analysis of those studies which used the Griffiths scale as a measure of the success of intervention does not provide any clear evidence that any one type of setting was any more effective in increasing D.Q. scores in the D.S. children who received intervention.

I.Q. Scores

Comparing the effects of the setting in those studies which reported I.Q. quotients is not as helpful as comparing those which used Griffiths D.Q. scores.

I.Q. scores were reported by Cunningham (Bayley Scales), Sandow and Clarke (Cattell), Coleman (Bayley Scales), Clunies Ross (Stanford-Binet), Ludlow and Allan (Stanford-Binet) and Mitchell (Bayley Scales). Of these only Ludlow & Allan and Mitchell provide the actual scores needed to make any judgement about the relative effectiveness of the programmes.

Developmental Schedules

The centre based programme of Hayden and Dmitriev (1975) employed the Gesell Developmental Schedule for three to 18 months in their Infant Programme. Results indicated a mean difference of one month between chronological age and mental age. In the advanced and pre-school programmes the intervention children levelled off at 95% of normal development on the D.S.P.I. whereas non-intervention children levelled off at 61%.

Connolly and Russell (1975), who also described centre based intervention, reported gross motor milestones (Gesell) in advance of non-intervention subjects. They also reported similar results for fine motor, social and feeding skills. Children who had begun intervention before six months of age were said to be less delayed than those who began later.

By comparison, those studies which involved the home or home and centre also reported significant increases in developmental milestones for intervention children. Clunies-Ross (centre and home) reported that, after 12-24 months intervention, children had achieved developments at or above the norms for their chronological age. The areas of greatest gain were reported to be social, cognitive and fine perceptual motor. The author indicated that those children who began earlier achieved a higher developmental status, but no data was provided to support this.

Hanson and Schwarz (home based) employed a continuous data-base assessment to report the effects of intervention. After 15-30 months intervention subjects achieved developmental skills consistently earlier than non-intervention subjects, although later than normals. For example, walking with support occurred at 13 months in the intervention subjects and at 10 months for normals and 20 months for non-intervention subjects. Clunies-Ross (home and centre) and Kugel (institution) claimed that some children involved in their studies attained some developmental milestones at the same age as normal children.

As with the studies which reported D.Q. & I.Q. scores, there is no evidence in studies reporting developmental milestones that the setting or social context of the intervention programme was related to the outcome in any consistent way. All of the programmes which employed

developmental measures reported continuous progress unlike some of the programmes which reported I.Q. and D.Q. measures where declines in quotients were observed over time.

Summary of Setting Comparisons

The attempt to compare studies on the basis of setting does not provide any real evidence to suggest that a particular focus or setting is related to the success of the intervention. Apart from one study (Piper and Pless 1980) all studies either demonstrated success in terms of gain scores or described positive effects as a result of an early intervention programme. However, the number of intervention programmes which provided specific evaluative data is small and it is tempting to give them greater weighting than those programmes which reported little or no specific data.

Limitations of the Review of Intervention Studies

A number of cautions emerged from this review of intervention studies with D.S. infants. These must be considered in the interpretation of the conclusions which have been drawn.

Appropriate Criterion Measures: A serious problem exists when evaluating an infant intervention programme solely in terms of a single outcome measure such as the D.Q. According to Lewis and McGurk (1972) "Infant Intelligence scales are unsuitable instruments for assessing the effects of specific intervention procedures" (p. 1176). According to these

authors, and others (McClelland 1973, Zigler and Trickett 1978), intervention programmes should be evaluated primarily in terms of the goals set and particular skills specified. For example, it is misleading to train children in object permanence behaviours and then to evaluate the training with a standard intelligence scale which does not sample these behaviours. Infant intelligence cannot be considered a unitary capacity which can be influenced by specific experiences in a few areas. (McCall, Hogarty and Hulburt 1972).

Further, the interchange of I.Q. and D.Q. scales in assessments of D.S. infants has been seriously questioned by Eipper and Azen (1978). Their study indicated that for D.S. infants these two assessments did not yield the same developmental patterns and were therefore not interchangeable. Problems also exist when comparing studies which used continuous data-based assessment with studies which used gain score measures. It has been suggested (Bricker, 1978) that the relevant targets for early intervention should be significant progress towards developmental milestones and the development of appropriate social behaviour (observed in naturalistic settings) rather than increases in gain scores.

Declining Developmental Status: A further problem exists in determining the extent of and reasons for the apparent decline in developmental status of D.S. children over time (e.g. Hayden and Haring, Ludlow and Allan).

The differences between D.S. and normal children are less apparent at a younger age when developmental tasks involve physical interaction with the environment, whereas the tasks of later childhood involve a greater emphasis on language (particularly expressive language). Consequently standardized measures involve an increasing emphasis on verbal abilities for children to score well.

It is possible for intervention to appear to be more effective in the development of physical skills than in the more complex areas of language and thinking. Those children who do less well in the former area during infancy probably include those children with heart abnormalities or other significant physical problems.

Because of these problems, it is debatable also whether it is ever meaningful to compare D.S. children with normal children on formal assessment measures which are designed for non-retarded children. It would be more appropriate to compare one D.S. population with another when evaluating the effects of early intervention procedures. However, the ethics of employing control groups in this type of research present real difficulties.

Family Involvement: Another problem highlighted by this review was the lack of evaluation of parent involvement in intervention programmes. Apart from the study by Piper and Pless (1980), which used the H.O.M.E. scale, none of the programmes reported measures of the settings or interactions

of the people within these settings. It is therefore impossible to say to what extent the parents or other elements in the environment contributed to the effectiveness of the programmes. Furthermore, those studies conducted in institutions clearly showed that modification of the setting to a home-like atmosphere was possible, but the effects of such modifications were not measured. Berger and Cunningham (1981) reported some results indicating quite different perceptual-cognitive processing systems in normal and D.S. infants. Their study highlighted the importance of early treatment procedures for the parent and child relationship, and suggested that abnormal patterns of interaction may have been set up before formal intervention begins. Cunningham and Sloper (1977a) emphasised the importance of the parents' early experience in the hospital and shortly after the birth of their handicapped child. They suggested that these experiences were important for the parents' subsequent mental condition, the development of parent-infant bonds and the child's own development. Marriages may be in jeopardy following the birth of a D.S. child and in such cases it is unlikely that parents will be willing or able to carry out training activities with their children. The fact that intervention programmes facilitate greater parent involvement does not necessarily mean more effective interaction between parent and child.

If, as is suggested by the majority of studies, the parent has an important role to play in the intervention programme, it was unfortunate that parent support services

were so infrequently mentioned. For example, grief counselling, genetic counselling and education, medical and specialist services for diagnostic or advisory support were not mentioned. Also, the provision of toys and equipment with which parents could carry out the intervention activities was mentioned in only one study. Not all homes would have, or be able to acquire, appropriate teaching materials.

Relevancy and Scientific Value: Clearly in mental retardation research there must be an interface between social policy and the implications of the research for providing better services for handicapped persons. None of the studies in this review have addressed this problem in any direct sense, although it is alluded to in the studies of Ludlow and Allan 1979 (mainstreaming of D.S. children following intervention) and Kugel, 1970 (institutionalised children placed in foster homes following intervention).

Summary and Conclusions

Bearing in mind these limitations, it seems reasonable to draw the following general conclusions from the results obtained in these intervention studies.

1. There is no clear evidence that the settings in which the intervention takes place has a significant effect on the children's progress. Although there was considerable variety in the types of criterion measures used, where direct

comparisons were possible, no differences in effectiveness could be associated with setting variables.

2. Studies which lasted for brief periods (e.g. 6 months) do not show sustained benefits for the children involved in the intervention. Although long-term follow-up indicates that initial gains do level off, the evidence from programmes lasting 12 months or longer indicates that gains can be maintained for longer (Hayden and Haring, 1977).

3. The earlier the intervention is embarked upon the better. Evidence from studies which took children in at different ages (e.g. Clunies-Ross, 1979, and Connolly & Russell, 1976, 1980) indicated that, in the same treatment programme, children beginning at an earlier age made greater gains.

THE COGNITIVE DEVELOPMENTAL APPROACH TO INFANCY

The Piagetian Approach to Infant Development

General Assumptions:

The developmental process according to Piaget (Reiss, 1967) is defined as identical with adaptation; the organism's self-regulatory activity which functions to maintain an equilibrium between the organism and its environment. Adaptation is divided into the processes of assimilation and accommodation. Assimilation is the process whereby the child can incorporate input from the environment without modification in structure. Accommodation is the process by which the input from the environment causes the child to modify his/her existing structures. Learning is the progressive assimilation of reality into a structure. The term "equilibration" is used to describe the "fit" between the child's acts and environmental realities.

According to Piaget all thought has structure and organisation. The basic units of cognitive structure are known as schemas, the simplest of which are reflex acts. Organisation helps in the adaptive process. For example, as the infant organises various sensorimotor schemas he/she constructs his/her first broad world view based on his/her combined actions on objects seen, heard, and felt in his/her immediate environment. It is suggested that for the D.S. child it is important to modify the learning environment in ways which will promote the learning processes of assimilation and accommodation.

An exposition of Piaget's theory of intellectual development can be found in Piaget & Inhelder (1969). The four main periods are as follows:-

(i) The sensorimotor period (birth to 1 1/2 - 2 years)

(ii) The preoperational period, subdivided into preconceptual (1 1/2 to 4 years) and intuitive (4 to 7 years)

(iii) Concrete operational period (7 to 11 years)

(iv) Formal operational period (11 years and upwards)

1. The Significance of Motor Development in the Sensorimotor period:

The sensorimotor period represents the first structuration of intelligence which subsequently becomes integrated into higher level structurations.

Co-ordinated sensorimotor skills are starting places for the infant's interaction with objects and events in the environment. This interaction, and the learning about the environment which results, constitutes the infant's first cognitive experiences. Without the development of co-ordinated physical skills the infant cannot actively learn about his/her environment in order to acquire cognitive structures. In the D.S. infant, where the development of physical milestones is known to be slower than that of the normal child, it would seem important to actively promote the

development of gross and fine motor skills in order that the child may use them to act upon his/her environment. By "acting on" the environment the processes of assimilation and accommodation function to develop new structures to deal with a wider range of situations and objects. Not only is the acquisition of a physical milestone important (e.g. sitting) but also the co-ordination of that milestone with other significant behaviours, (e.g. use of the eyes, hands and trunk in order to explore the properties of objects) in order that sense may be made of the world.

2. The Significance of Stages and Transitions between Stages:

Piaget described the sensorimotor period as six hierarchically structured stages. Whether these six stages represent structurally distinct stages is open to question. (Uzgiris 1976(a); 1977). Piaget saw the essential characteristic of each stage as the form or organisation of intellectual activities at that stage. It is therefore the structure, and not the content, of the activities which is important. Whilst Piaget used the term "stage" to refer to the six levels of sensorimotor development which he described, he did not spell out the underlying structural organisation for each stage in the way in which he had discussed the organisation of thought processes characteristic of the later stages in cognitive development. This theory claims not only an invariant sequence of achievement but also a "structuration of the achievements constituting each stage of development" (Uzgiris, 1973, p. 182).

The work of Uzgiris & Hunt (1975) which looked at the sequential achievement of competencies characterising sensorimotor development suggests that the rate of development during one period did not predict development at a later period. Uzgiris (1973) suggested that it

> "may not be profitable to think of development in a step ladder fashion, the attainment of one rung in the ladder making it possible to reach the next higher rung. While the attainment of the lower rung may be necessary for moving to the next higher rung, other factors seem to intervene to influence the rate of progression" (p. 189).

An attempt by Uzgiris (1973) to examine the interrelationships between achievements (e.g. between object permanence and the development of means) during the first two years revealed no clear patterns of relationships. Object permanence refers to the infant's understanding of tangible physical objects. During infancy the child comes to assume that external objects are relatively permanent and continue to exist even when not directly perceived. The development of means involved what infants do to cause events or to obtain objects which they have come to desire. In such situations the infant must combine the use of one behaviour pattern as the means of gaining another. However an examination of the relationships between object concept development and the three other branches of psychological functioning (development of means, operational causality, object relations in space) suggested four distinct levels in object concept development (discussed below).

In Piaget's theory "transitions" are related to disequilibrium in the system. This disequilibrium is evident in the inconsistency in level of performance of an individual across a range of tasks. Uzgiris (1977) suggested that "generally speaking greater variability in performance of a group of individuals might be expected at a time when many are making a transition to a higher stage than during the ascendance of a particular stage" (p. 100). When looking at the sensorimotor period it was suggested by Uzgiris (1976(b)) that it is the interweaving of understandings of the properties of objects and understandings derived from the co-ordination of actions, which may be important in the transition to higher levels of development in infancy. This may be of critical importance for the development of the D.S. child who is known to be retarded in certain areas. These areas will, in the normal child, each positively promote disequilibrium within a stage and allow the child to enter a higher level of functioning.

The areas which are suggested as important for the D.S. child in this regard are poorly developed musculature and control of body in space; reduced curiosity and motivation; frequent difficulties with vision and hearing; physical illness leading to excessive tiredness and apathy; reduced level of affective functioning; lack of appropriate environmental experiences.

3. The Stages of Sensorimotor Development

The development of cognition in the D.S. child within the intervention programme was based on Piaget's description of stages in the sensorimotor period. Although the behaviours described below are according to "stage" the researcher argues (supported by Uzgiris (1976(b)) that the co-ordinations between schemas constructed in different domains should be expected only at the culmination of the sensorimotor period. Development was conceived primarily from simple to complex with critical concern placed on factors such as flexibility, generalising ability and practice in order that "transitions" might occur.

(a) Stage I : (birth to one month) (The interpretation of the sensorimotor stage for the D.S. child is described in Chapter IV)

The infant is described as being largely under the control of reflexive behaviours. Development is concerned with imposing one's own pattern on the behaviours, rather than merely reacting. Thus these primitive reflexes gradually became inhibited and under voluntary control. As the immature D.S. infant may have strong reflexive patterns and reduced muscle tone, the following behaviours of this period were emphasised in order that the infant might attain voluntary control and thus move into the succeeding stage: exercising of reflexes in order that practice would promote learning; focusing; following a slowly moving object; increasing muscle tone.

(b) Stage II : (one to four months)

This period dealt with what Piaget described as Primary Circular Reactions; i.e. an infant's chance behaviour leads to an advantageous or interesting result which he is able to repeat after a process of trial and error. In order to encourage the development of schemas of this nature, situations need to be constantly "set up" for the D.S. infant where accidental learning might occur. Accommodation was arranged placing stimuli such as the child's hand in close proximity to his/her mouth in order that he/she might suck on that as well as the nipple or teat.

Curiosity is an important motivational factor according to Piaget. Curiosity was aroused by exercise of the eyes in looking at things. Such activity led to the development of visual imitation. Vocal imitation of involuntary sounds also occurred during this period. Again these behaviours need to be exercised and reinforced in order to develop sequentially. As the child's reflexes come under control and muscle tone increases he/she will be able to hold the head erect in order to follow moving objects turn toward sound and accidently grasp objects readily to hand. The D.S. child may continue to have vestiges of primitive reflexes such as involuntary grasping during this stage.

Stages I and II lack any indication of the mature object concept.

(c) Stage III : (four to ten months)

This stage was characterised by a more mature behaviour whereby the infant learned how to make the movements which led to interesting results. However Piaget asserted that if the

infant did not make the connection no further learning was possible. Once interest and connection between act and event are established the infant desired to repeat the event. In order that this learning will occur in the D.S. child appropriate situations must be provided. Again the development of this stage and the transition to the next depend on the level of development of gross and fine motor skills, curiosity, attention and the systematic development of imitation. This period is characterised by a greater range and variety of schemas than was previously available to the infant.

Stage III involves the acquisition of four new behaviour patterns which represent progress in the development of the concept of the object.

(i) visual anticipation of the future positions of objects
(ii) interrupted prehension
(iii) deferred circular reaction
(iv) ability to recognise an object when it is only partially visible

According to Uzgiris (1977) "development during the first half of the year can be fostered both by the provisions of inanimate responsive stimulations and by increased contact with attentive and interested persons" (p.106). She also suggested that any opportunity which the infant had for bodily activity with kinaesthetic effects would facilitate auditory and visual changes.

(d) Stage IV : (ten to twelve months)

This stage included the important behaviours of separation of means and relationships. This separation is accompanied by a more prolonged and systematic search for lost objects. Behaviours were clearly intentional, and infants could take account of the world "out there". Activities which provide opportunities for exploring this relationship are important for the D.S. infant: e.g. play and imitation in the form of repetitive banging, stacking of blocks, pushing carts. Regularity of environmental structures was suggested by Uzgiris (1977) (supported by Elardo Bradley & Caldwell, 1975 and Wachs, 1976) as an important variable. These authors suggested that ordering of occurrences served as goals for the infant and facilitated developmental progress. In the normal child this stage will correspond with greater physical mobility and thus the ability to explore the immediate environment. In the less mobile D.S. child it is important that the child experience the same opportunities for learning through structuring his/her experiences within his/her mobility. As with previous stages the behaviours of this period depend for their execution upon co-ordinated gross and fine motor skills, in association with motivation and responsivity.

(e) Stage V : (twelve to eighteen months)

This stage termed "Tertiary Circular Reactions" involved active experimentation with new means. The infant would search systematically for a lost object (representing that object with a mental symbol) through a fairly long series of hiding in different places.

As this stage is more likely to coincide with the beginnings of independent movement (creeping or crawling) in the D.S. child, it is still considered necessary for the infant's experience to be structured around the behaviours of this stage. As normal children walk and run around their environment they will experience their world from different aspects.

(f) Stage VI : (eighteen to twenty-four months)

This stage included the transition to the next stage where the infant is able to use mental symbols and words to refer to absent objects. This period allowed the infant to move from the world of immediate experience to that of symbolic thought. Interaction with others was important at this period. Verbal accompaniments to interactions help segment activities and emphasise the relationships between variously occurring behaviours. Uzgiris (1977) suggested that

> "such interactions require an attentive and interested adult, one who models not only the words but the cultural emphases as well .... the aspect of verbal stimulators that is found to relate most strongly to infant developments is language directed at the infant, not occurrence of speech in the vicinity of the child" (p. 109).

It could be suggested that such considerations are of specific importance for the D.S. child. Lack of mobility and lack of expressive language (on the part of the child) provides little reward or incentive for significant other to

continue to pursue appropriate social and verbal interactions. This period was characterised by a fully elaborated concept of the permanence of objects; the ability to play imaginative games and to imitate models even when absent.

For the D.S. child it is likely that this stage will correspond with the beginnings of independent walking and it would seem important that the children be helped to reach this physical stage complete with the cognitive behaviours of their normal peers.

Recent research on the significance of the object concept in the sensorimotor development of D.S. infants (Greenwald & Leonard 1979; Corrigan, 1978 and Mahoney, Glover & Finger, 1981) claimed that the stage of sensorimotor development in means-end schemas, causality and schemas for relating to objects was associated with significant differences in level of communicative skills. Their results suggested that the level of sensorimotor development may be an important factor in the communicative development of the D.S. infants. The retarded subjects all exhibited the specific developmental sequence specified by Piaget. This finding supported the findings of Cicchetti & Sroufe (1976) who found the same invariant sequence in relation to affective expression and level of cognitive development in D.S. infants.

Summary

Piaget's theory was described by Ginsburg & Opper (1969) as "interactionist": i.e. experience does not exert effects <u>on</u> an infant, but instead effects <u>with</u> an infant.

The child modifies raw experience as much as it changes him/her, thus intellectual development results from an interplay of internal and external factors. For the D.S. child the development of physical competence during the sensorimotor period will promote a situation whereby the environment can be accommodated and assimilated. The accomplishment of physical skills gives the child the basic operational tools for learning from the environment. For Piaget, physical competence was much more than developmental maturation represented by specific behaviours (as were Gesell's stages). The theory of "stage" was an abstraction which permitted understanding of what an infant does regardless of the particular behaviours involved.

It is suggested by this writer that the smooth transition between Stages III and IV may be of specific importance for the D.S. infant. Up until the age of nine months very little is expected of any infant and it would be possible for a retarded infant to approach this age without the necessary cognitive behaviours to embark upon the beginnings of representational thought.

The present study is based on the view that the structuring of the child's experiences, arousing curiosity and heightening responsivity through Stages I to III would enable the child to have acquired and practised a sufficient quantity and variety of sensorimotor schemas to facilitate a transition into representational thought, which is said to begin with Stage IV.

A recent conceptualisation of "stage" structure was made by McCall, Eichorn & Hogarty (1977). In a commentary on the paper Schaefer (1977) suggested that it served the important function of shifting the focus of research from the isolated infant to the infant's interactions with his/her environment. He suggested also that infant intervention programmes often focus solely on the acceleration of early perceptual and motor skills (an idea supported by Robinson & Robinson 1978), although evidence from the work of Bronfenbrenner (1974), Schaefer (1970, 1972), could indicate that

> "the focus should be on supporting parent-child relationships which influence the development of language and symbolic relationships .... Evidence is accumulating that a socioecological developmental analysis of the interaction of the infant with his environment will contribute to understanding of and to intervention in child development" (Schaefer, 1977, p. 105).

THE ENVIRONMENTAL VARIABLE IN EARLY INTERVENTION

The study of the relationship of environmental stimulation to intellectual development has become a major focus for study in recent years. In particular, with the experience obtained from the establishment of such programmes as "Head Start", the importance of early experience (i.e. the first two years of life) has been increasingly stressed. Evidence for the critical significance of early experience and its effects on intellectual functioning is summarised by Wachs, Uzgiris & Hunt (1971).

Their review suggests that two kinds of home circumstances relate to psychological development in young children.

(i) the intensity of the stimulation and the variety of experiences to which the infant was exposed.

(ii) the opportunity to hear vocal signs for specific objects, actions and relationships.

The importance of linguistic experience for D.S. children was highlighted by Buium, Rynders & Turnure (1976) and O'Kelly-Collard (1978). Both studies supported the notion that D.S. infants received a different linguistic input from matched "normal" children. O'Kelly-Collard suggested, first, that the mother-child interaction was probably distorted by the disturbing impact of the handicapping condition, and secondly that the child played a major role in influencing adult conversational style.

A study by Wachs (1976) indicated reasonably clear relationships between specific classes of environmental stimulation and the development of cognitive - intellectual abilities. The author suggested four major classes of experience which seemed particularly important for early cognitive development.

(i) Environmental predictability: i.e. a situation where things have their expected time and place

(ii) Adequacy of stimulation:

(a) amount of visual stimulation early in the second year of life, and tactual-visual stimulation after 18 months

(b) variety and change in stimulation offered the child particularly before 18 months

(iii) Lack of physical or visual restraints placed on the child's interaction with his environment

(iv) The number of toys a child possessed which produced auditory-visual feedback when activated.

Uzgiris (1977) extensively reviewed the effects of environmental experiences on intellectual functioning. In her conclusion she suggested that effective child-rearers performed three major functions for their infants which distinguished them from other child-rearers. Those three functions were:

(i) designing the child's world.

(ii) consulting for the child.

(iii) disciplining or controlling the child.

Further studies on the link between cognitive development and the quality of stimulation available in the early home environment have been carried out using a variety of environmental measures and a range of cognitive outcome measures. One environmental measure which has been used extensively is the "Home Observation for Measurement of the Environment" Caldwell (undated). This inventory is an observation interview procedure which assesses the quality of stimulation available to the child in the home. Bradley &

Caldwell (1976) reported evidence of a substantial relationship between the quality of stimulation (as measured by H.O.M.E.) which the child received during the first two years of life and Stanford-Binet I.Q. at age 4 1/2 years. These findings were an extension of earlier findings by Elardo, Bradley & Caldwell (1975) in which a relationship with Binet I.Q.'s at three years was found. Bradley & Caldwell (1976) suggested that parents should assist children under two years of age to organise their environments so that they might "move more easily from sensorimotor to pre-operational thinking" p. 1173. In a second study Bradley & Caldwell (1967) provided evidence in support of this suggestion.

A more recent study by Bradley & Caldwell (1980) using the H.O.M.E. Inventory, and the Bayley Scales, investigated first, the extent to which measures of environmental processes at six months and twelve months of age provided independent predictions of later Binet I.Q.'s and secondly how measures of environmental stimulation and measures of cognitive competence during infancy together relate to mental test peformance at age three years. Their results supported the earlier findings and those reported by Wachs (1976) and Wachs & De Remer (1978).

In a recent study Piper & Ramsay (1980), using the H.O.M.E. Inventory and the Griffiths Mental Development Scales, found that three H.O.M.E. Inventory sub-scales were significantly related to the Griffith's Personal Social Scale. The 37 D.S. infants studied were differentiated according to degree of decline in mental performance over a six month

period. The group showing least decline had homes in which there was better organisation of the physical and temporal environment.

PARENT-PROFESSIONAL AND PARENT-PARENT RELATIONSHIPS IN EARLY INTERVENTION

The need for parent involvement in the provision of special education services has long been recognised (Gallagher, 1956). Jenkins, Stephens & Sternberg (1980) quoted Begab (1963) as noting "that the family of the handicapped child needs education and training in the management of their child, needs demonstrations of effective teaching techniques, and needs access to supportive community services" (p. 256).

There is evidence that through appropriate home instruction parents can increase their effectiveness and influence their child's development (Bereieter & Engleman, 1966; Karnes et al., 1968). After an extensive review of the literature, Streissguth & Bee (1972) concluded that the teaching style of the mother is very important in shaping early motivation and cognitive functioning. Such instruction may also lead to improved family adjustment and can in fact facilitate normalisation (Baker & Heifetz 1976; Brophy 1970; Denhoff & Hyman 1976; Haynes 1976; Wiegerink & Parrish 1976).

Grobler (1973) in a study of 30 home reared D.S. children (with daycare or institutional options) found that when D.S. children were cared for at home there was no detrimental effect on their families (particularly on their

brothers and sisters).

Cunningham & Sloper (1977 (a)) (1977 (b)) in a study of 47 D.S. infants isolated two fundamental aspects of parent support. One was the attitude of the parent towards the infant and the other provided practical guidelines for helping the infant's development. This viewpoint was supported by the work of Mittler (1974, 1975 (a), 1975 (b) and McConkey & Jeffree 1975).

Confirmation of the importance of training mothers of D.S. children was provided by the research of Bidder, Bryant & Gray (1975). In this study mothers in the experimental group were taught behaviour modification techniques and they participated in group discussions on dealing with their family and personal problems. Gath (1979) suggested the need to maintain a balance between "enough support to inspire confidence, without incurring dependency" (p. 163). However, caution was required if support was not to become counter-productive by increasing parental dependency and by so doing reducing infant developmental gains (Sandow & Clark, 1978).

Although little mention was made specifically of the father's role in helping the handicapped child, it was suggested by Gath (1977) that fathers also have problems adjusting to the parental role and have particular fears and problems associated with the reality of retardation. Gath (1979) concluded that marital breakdown appeared to be less frequent in families where there had been early intervention

with emphasis on early counselling of parents than in those families left isolated and helpless. The need for counselling after the birth of a handicapped child was suggested by Irvin, Kennell & Klaus (1976). Quoting Solnit & Stark (1961) they suggested that one of the early tasks of parenting was to resolve the discrepancy between the idealised image of the child they were expecting, and the actual appearance of the real and handicapped infant. This was frequently a very difficult adaptation requiring professional help with the mourning process.

Golden & Davis (1974) discuss the particular problems of the new parent of a D.S. child. They believe that the birth of a D.S. child represented a major crisis for physicians and parents. They suggest that "frightened, hysterical and grieving parents should not be offered stereotyped solutions or be pressed for lifetime decisions" (p.7).

Lillie (1976) insisted that unless effective parent programmes were developed as a major element of the parent-child triad in early intervention, only marginal success is possible. He postulated four conceptual areas which he suggested should be considered in any parent component of systematic structuring in child development programmes.

(i) Social and emotional support

(ii) Exchanging information

(iii Parent participation

(iv) Improving parent-child interactions

An associated area of concern in early intervention was the role played by parent-to-parent support systems in helping to implement the intervention process. The literature on crisis theory emphasised the vulnerability of the individual under stress to the significant influence of others in his environment (Rapoport 1965). Although little is published of any note in this area, Murphy Peuschel & Schneider (1973) suggested the powerful influence for positive adjustment which parents received as a result of close involvement with others undergoing the same stress. They also suggest that the closeness of the bond to the group mitigates feelings of isolation and depression in mothers of D.S. infants. Silverman & Murrow (1976) supported this viewpoint in relation to other potentially stressful family crisis situations. They proffered the idea that the greatest pay off for prevention of mental health emergencies might be in providing opportunities for parents to learn how to assume new roles.

CHAPTER III

RATIONALE

INTRODUCTION

This chapter outlines the rationale behind the early intervention programme. It is outlined in four sections.

(i) General Context and Justification for the Study.

This section describes the influences which may have had an indirect bearing on the functioning of the D.S. child and his/her family. It relates primarily to existing community structures over which the early intervention programme had very little control.

(ii) The Structured Programme.

This section describes the content and functioning of the early intervention programme as it related to the child, his/her family and the professional staff involved in intervention.

(iii) The Semi-Structured Programme.

This section described the outside influences which directly or indirectly affect the development of the D.S. child which were mobilised by the early intervention programme.

(iv) Assessment.

This section describes the formal and informal assessment procedures which were employed in this study.

GENERAL CONTEXT AND JUSTIFICATION FOR THE STUDY

Application of Bronfenbrenner's Model to the Early Intervention Programme

The systems approach of Urie Bronfenbrenner (1974, 1977, 1979) referred to earlier can be summarised in his words as follows:

> "A broader approach to research in human development is proposed that focusses on the progressive accommodations, throughout the life span between the growing human organism and the changing environments in which it actually lives and grows. The latter include not only the immediate settings containing the developing person but also the larger social contexts, both formal and informal in which these settings are embedded" (Bronfenbrenner 1977, p. 513).

It would seem appropriate to view the expectations of, and the justification for the present study within the general framework of the ecological model as described by Bronfenbrenner. Although the fit is not exact, the following rationale for the concept of the intervention will be described in accordance with the four "options" as described in the previous chapter.

1. The Microsystem:

> Bronfenbrenner describes the microsystem as a "pattern of activities, roles and interpersonal relations experienced by the developing person in a given setting with particular physical and material characteristics" (Bronfenbrenner, 1979, p. 22).

Bronfenbrenner suggests that the critical element in the description of the microsystem, is how it is experienced by those participating in it. Therefore not only are the effective properties relevant but also the way these properties are perceived by the person in that environment.

The primary microsystem is normally the child's family. The intervention programme can be viewed as the establishment of a new microsystem comprising activities, roles and interpersonal relations. The physical setting was at the plunket rooms, the activities in which the participants engaged constituted the structured content of the study of the early intervention programme. The particular role in which the infants were involved were those of participants in the programme. The caregiver's roles principally involved reciprocal parent-professional partnerships where both were "learners" and "participants" in the delivery of the programme. Relationships between the parents of different children were also part of this new microsystem. This new microsystem was thus concerned with a variety of activities and relations affecting the developing child.

Viewed in terms of the characteristics mentioned above the new microsystem can be seen to affect the home microsystem in the following ways. The physical setting may be adapted to suit the specified physical needs of the handicapped child, for example, by altering where the child sleeps and plays and/or specific use of household equipment for teaching skills. The activities engaged in by the family in relation to the infant are modified by the intervention programme; for example, specific teaching of cognitive skills at an early age. How the intervention programme (as a new microsystem) modifies the existing system will differ according to the mother's personal style of interaction, the role of the father, the role other siblings play in the existing family structure, and the socio-economic status and belief systems of a particular home microsystem. The roles which the family play in relation to the child will alter in that caregivers will be engaged in the role of teacher of the handicapped child.

The constitution of a new microsystem in addition to the home was considered valid for the following reasons:

(i) It would not have been appropriate to offer the services of the whole interdisciplinary team in a home situation at any one time.

(ii) It would have been uneconomic to repeat the intervention proceedings in fourteen different homes each week.

(iii) The new microsystem facilitated parent-to-parent support and promoted new and continuing relationships between the families attending the programme.

(iv) The intervention programme could be seen as a continuing system of stable and reciprocal relationships very different in structure from what could be expected in an experimental laboratory location. The focus of the setting was the two person mother-child dyad interacting with other elements of the setting.

2. The Mesosystem

The mesosystem is a system of microsystems. It "comprises the interrelations among two or more settings in which the developing person actively participates" (Bronfenbrenner, 1979, p. 25).

Such interrelations typically encompass interactions between school, peer group and family.

The intervention programme (the new microsystem) was introduced into the mesosystem, thus affecting other microsystems in the network, and altering their structures. The composition of the nested structures of the micro and mesosystems is fluid and may be seen differently depending on what sets of relationships are being examined. In practice,

infants are primarily involved in one microsystem only, namely, the home. By creating another microsystem in which they participate (the intervention programme) a mesosytem is formed which would otherwise not exist. Bronfenbrenner refers to such changes as ecological transitions.

The intervention programme, as a microsystem allowed for the participation of child, family and therapists in a number of different settings, that is, multisetting participation. The child (primary link), the family, the therapist and the paediatrician (supplementary links) participated initally in the hospital setting at the time of the birth of the D.S. infant. The intervention clinic provided another focus for participation which had linking properties with the initial setting. The therapist's visits to the home, and the paediatrician's visits to the intervention clinic provided face-to-face links between the participants. Communication between these involved occurred in both directions.

Transcontextual dyads (two person systems who engage in more than one setting) operate to enhance the person's capacity and motivation to learn.

"When a variery of joint activities are carried out in a range of situations, but in the context of an enduring relationship, the latter both encourages the development of higher levels of skill and tends to generate especially strong

and persistant levels of motivation" (Bronfenbrenner, 1979, p. 214). Parent-child dyads operated across a number of settings as a consequence of the early intervention programme.

Families who participated in the programme could be seen to be affected by the changes in their child and individual family microsystems took the opportunity to become involved in a number of different settings. For example, friendship networks involving visits, communal outings, children's picnics, adult discussion groups and dinner evenings could be generated by the parents themselves (vid. Chapter VI, p. 388).

Also, the women in particular seemed to engage in more community based activities. Some attended courses on child development, others assumed office in child orientated organisations such as plunket, kindergarten, church creches. As such, social contacts with other members of the community increased markedly. Bronfenbrenner suggests that changes in a lifestyle which have a supporting effect on children's continued development reflect a development of environmental mastery not previously experienced by those involved.

In summary, the intervention programme was seen as constituting a new microsystem out of which a mesosytem (which would otherwise not exist at the infancy stage) would be created. Bronfenbrenner (1979) suggested that these new social systems engage the child and his/her caregivers in increasingly complex interactions, and as such broaden experience.

"Human development is facilitated through interactions with persons who occupy a variety of roles and through participation in an overbroadening role repertoire" (hypothesis 14, p. 104).

Evidence for the Effectiveness of Early Intervention

Perhaps one of the more powerful arguments for the potentially advantageous effects of early intervention has been the shift in classification of children with D.S. Textbooks published 10 years ago classified most of these children as severely retarded. However, data from programmes currently focusing on this population are now indicating that the majority of these children are functioning within the mild to moderate range of retardation (Bricker & Bricker, 1976; Hayden & Dimetriev, 1975). There are also data indicating that children raised at home tend to function more appropriately than those raised in institutions (Stedman & Eichorn, 1964). Such a major shift in potential intellectual functioning is unlikely to be attributable to genetic changes in that population, and is more likely to be the result of early intervention and education of parents.

Whether through direct or indirect influences, mental retardation researchers have gradually become aware of more applied issues and their relation to research. The recent work of Brooks & Baumeister (1977) sees mental retardation as first and foremost a social phenomenon. "That which society views as retarded behaviour is the first and only true criterion for defining retarded behaviour" (p. 408).

The Early Studies of Change in Intelligence

Against a background of 19th and early 20th century thinking (expressed in the writings of Darwin, Locke, Rousseau, and latterly Freud, Erikson, Montessori) orphanages and foundling homes came to be exposed as destructive influences on the development of infants (Goldfarb, 1943; Spitz, 1945). The dramatic outcome of these latter studies was the finding that experiences of early care affected the physical, cognitive and social development of children. Around this time, Skeels & Dye (1939) in the United States, demonstrated that individualised care of biologically and mentally disadvantaged children could prevent and reverse the delays in development. In Skeel's view the success of the experimental intervention was attributed to the relationship which developed between the child and the adult in the institution. As a result of this experience, Skeels & Dye persuaded the State Board of Control to approve an informal transfer of 1-2 year old mentally retarded children from the State orphanage to the State school for the retarded. A contrast population remained in the orphanage. Over a two year period the experimental group showed a mean I.Q. gain of 27.5 points. Skeels & Dye concluded from this study that it was possible to increase intellectual functioning by providing disadvantaged pre-school children with a more adequate psychological environment.

These pioneer studies have had a great influence in establishing that intelligence is not fixed. Prior to this time there were two basic long-entrenched assumptions that influenced both the science and the treatment of developing individuals: "fixed intelligence" and "predetermined development". These notions assumed intelligence to be an inherited capacity which develops to a predetermined level and at a fixed rate. The measure of this fixed intelligence, the I.Q., accordingly remains constant throughout life. This concept of intelligence seemed perfectly reasonable when viewed against a background of unalterable institutionalised existence for those persons classified as retarded. Binet (1916, p. 37) expressed the idea that the purpose of classification was as follows:

> "to be able to measure the intellectual capacity of the child ... in order to know whether he is normal or retarded. We should therefore study his condition at the time and that only. We have nothing to do with his past history or with his future; consequently we shall neglect his aetiology and shall make no distinction between acquired and congenital idiocy; ..... we shall limit ourselves to ascertain the truth in regard to his present mental state."

Although provoked by humane concern, Binet's search for scientific exactitude continued to provide a rationale for the discrete nature of the measured I.Q. Much of the new research was not then directed toward the solution of practical

problems. Experiments dealt with learning, motivation, perception, memory and other concepts from general psychology. Much normative data on the behavioural potential of the retardate resulted. The retarded were then compared with normal children and adults, or occasionally with other retardates who differed psychometrically or aetiologically. For example D.S. children were compared with Cerebral Palsied or Spina Bifida children.

Post-War Influences on the Concept of Intelligence

It was primarily the conflict between the growing post-war demand for non-institutionalised care of both the retarded and non-retarded, and the continuance of the use of I.Q. tests as outcome measures of intellectual functioning that led to an increasing dissatisfaction with traditional research methodologies. Concern with the rights of individuals, shifts in values, changes in the family, from an extended to a nuclear structure and the war on poverty, all demanded changes in society's attitudes towards developing children. What were once acceptable ways of classifying the retarded or developmentally delayed for institutionalised life came to be viewed as no longer appropriate. Such changes however did not happen suddenly, nor were they confined to areas of medical concern. The previously unnoticed intervention effects of the Skeels & Dye (1939) study came slowly to be regarded as particularly important topics for research.

If, therefore, we accept the Brooks & Baumeister (1977) argument that mental retardation is a social concept, the burden is on the experimenters to justify their constructs from a perspective of ecological validity, to provide a rationale for measures and to show the real-life basis on which their subjects differ. As has been mentioned, research in this area has traditionally been confounded by the adoption of I.Q. tests as a means of classifying children. We now know that I.Q. tests do not possess sufficient validity to justify this elevated position, and in particular their relevance to individual programming for the developmentally delayed infant and young child is questionable (McClelland, 1973; Zigler & Trickett, 1978; Ballard, 1980).

The Relevance of the Strong Life-Span Position for the Present Study

The Christchurch early intervention programme also conformed to the strong life-span position (Goldhaber, 1979), by emphasising the continuity of environmental intervention for D.S. infants. The programme described in this study is not a "one shot" intervention, but rather a continuing commitment by parents, children and teachers through infancy, pre-school and the primary school years. The programme also emphasises the importance of the family, and the immediate settings containing the handicapped child. The strong life-span position refers to the "potency" of the early environments in which the child is functioning. Such potency is enhanced by congruence between the family expectations and

the intervention. The emphasis on continuity and family commitment in continuing intervention clearly supports Bronfenbrenner's (1975) conclusion that "without family involvement, intervention is likely to be unsuccessful, and what few effects are achieved are likely to disappear once the intervention is discontinued" (p. 470).

Assumptions underlying the Intervention Programme

The following assumptions formed the basis of the general philosophical approach adopted in the study. The structure of the programme provided the means whereby such goals might be realised.

(1) That D.S. infants (0-2 years) can approximate all normal developmental milestones with help from specific intervention procedures.

(2) That D.S. children remain within their family structure (as opposed to the option of institutionalisation) and that parents are assisted by supportive listening with their initial grief and come to accept their handicapped child as a valid and worthwhile person within a normally functioning family unit.

(3) That children from alternative parenting structures, or those who are in foster care from birth because they are unacceptable to their natural parents, are provided for within the existing framework of the intervention programme.

(4) That through the implementation of the D.S. intervention programme, society as represented in Bronfenbrenner's model may be influenced in ways which do away with the inaccurate stereotypes and promote greater understanding of the needs and rights of D.S. children and their families, e.g. each child should have the right to participate in education alongside normal children if she or he is competent to do so. Areas of the macrosystem which may indirectly be influenced include the Department of Health (beliefs about the rights of the handicapped to medical benefits). The ideology of voluntary organisations, Education Boards and the economic and political system of New Zealand affecting the rights of the handicapped.

THE STRUCTURED COMPONENT OF THE INTERVENTION PROGRAMME

Introduction

The location and timing of the intervention procedures were decided upon after consideration of what might be possible or practicable for the majority of New Zealand families. Constraints placed upon people by travel, economics, family responsibilities or other sociocultural phenomena were taken into account when setting up the programme.

Viewed as a whole the intervention programme comprises the following major elements.

1. A structured cognitive, physical and language programme for D.S. infants based on the Piagetian model of development was provided once weekly.

2. A parent to parent support was part of the once weekly clinic visit and was organised by the intervention team for the mutual benefit of those present.

3. Specialist referral services whose expertise could aid the functioning of the D.S. child and his family were made available. For example, genetic counselling, paediatric clinics, hearing and visual assessments.

4. Home visiting was undertaken on both a regular and specific need basis.

It was considered appropriate to view the educational intervention as a parent-professional partnership aimed at strengthening the all important mother-child dyad. Bronfenbrenner states that:

> "An analysis of the microsystem must take into account the full interpersonal system operating in a given setting. This system will typically include all the participants present (not excluding the investigator) and involve reciprocal relationships between them" (Bronfenbrenner, 1979, p. 66).

He further proposes that:

> "The analytic model must take into account the indirect influence of third parties on the interaction between members of a dyad. This phenomenon is called a 'second-order effect'"
> (Bronfenbrenner, 1979, p. 68).

Although traditional attitudes and beliefs about handicapped people are changing, the "stigma" of intellectual handicap does still exist and is perceived by new parents of a D.S. child as being a threatening reality. It was believed therefore that to run the intervention programme from an existing community facility which had no connotations of "handicapped", would enable such parents to confront gradually both their feelings and their handicapped child in a less threatening environment without the possibility of their having to view numerous handicapped children of varying ages at each clinic visit. Whilst in a state of shock or grief the experience of older, possibly unattractive retardates may engender feelings of intense despair and hopelessness, which could be guaranteed to lower expectations and enthusiasm for what potential their own newborn might have. Facilities already catering for the handicapped were therefore avoided. The Plunket rooms were chosen for varying reasons (vid. Chapter IV). This author's belief was that such a community facility was a perfectly acceptable place for a new mother to bring a baby and as such acted to minimise anxieties and stresses associated with the accepting of intellectual handicap.

Cognizance of these hypotheses was taken when implementing specific intervention procedures. For example, the personnel forming the professional component of the intervention programme had to take care to deal with each child and his family as an individual set of relationships. Although one member of the professional team instigated the immediate and initial support following the birth of the child, it transferred naturally from therapist to other parents during the early months. As a consequence of this transition the professional prevented the possibility of a "dependency" relationship developing. An additional benefit to the programme was the significant saving in already limited specialist time which resulted from the transition. Language used and style of interpersonal relating needed to be appropriate and easily understood. Respect for and understanding of family structures and beliefs had to be considered when suggesting educational activities for the handicapped child.

(a) Parents as Teachers

The lack of effective help for parents of infant D.S. children has until now been one of the weakest aspects of current services. If parents are left unsupported there is a danger that a sense of isolation from the community and from services may lead to apathy and pessimism about the possibilities of helping the child. Berger & Fowlkes (1980) suggest that learning that a child is abnormal violates the expectancies for achievements that most parents hold for their children. This places parents in danger of feeling incompetent and helpless.

There are a number of reasons why parents should attempt to involve themselves in the development of their children. As the numbers of educational programmes for young children have increased rapidly in the last few years there has been a mounting awareness of the need to involve parents in a reciprocal manner. Research efforts such as the work of Gray, Klaus, Miller & Forrester (1970), Karnes et al. (1972) and Levenstein (1970) point out that educational efforts in day care centres, nurseries, Head Start Centres, and public schools should be augmented with parent training programmes. After an extensive review of the literature, Streissguth & Bee (1972) conclude that the teaching style used by the mother is very important in shaping early motivation and cognitive functioning. In summary, the author saw two general purposes for providing viable parent based programmes in early education of the handicapped.

(i) To improve the professional's ability to provide effective services to children through their parents, i.e. to combine the teaching needs of parents with traditional attitudes towards the sanctity of the family and the home.

(ii) To provide a supportive system for parents in accepting their role as parents and to fulfil their personal needs as individuals (Lillie,

1975). White, Kaban & Attanuci (1979) suggest that if families were routinely offered support for childrearing during the pre-school years the experience would be less stressful, more pleasurable and give better results for children, families and society as a whole.

The parent-professional partnership should involve a continuous exchange of information centering around the following goals:

(i) To provide parents with an understanding of the rationale, objectives and activities of the programme in which their child is a participant.

(ii) To develop understanding of the continuous growth and development of the child as they apply to the child's interactions in the home and community.

(iii) To provide the professional team with the necessary information (from self-report and observation) on the child to facilitate the effectiveness of the structured programme.

Belief in the worth of parent participation in the continuing activities of the programme is summarised by Lillie (1975). His assumption is -

> "That by productively utilising the parents in activities their feelings of self-worth will be enhanced. Their understanding of children will increase and a large repertoire of experience and activity for parents to draw upon for interaction with their own child will be developed. Another important purpose for parent participation in the programme is to provide needed manpower" (p. 10).

A by-product of such involvement by parents in their child's development was the assumption that by exchange of information with professionals and others, by use of modelling techniques and by exposing families to the appropriate literature they might be assisted to become more effective child rearers, not only of their handicapped child but also of subsequent children. (vid. Appendix G for selection of literature given to parents). The socialisation research of Baumrind (1980) suggests the necessity for viewing both parents as the key figures by which developing children (through insight, training and imitation) acquire the habits and values congruent with adaptation to their culture. It therefore appears valid to assume that if the handicapped child has a right to be nurtured, there must be persons with a complementary obligation to nurture (Baumrind 1971). Baumrind further suggests that the most successful parents will see their child as maturing through stages requiring a successive transfer of power and responsibility to the child in respect of his or her behaviour. This maturational process is viewed

not as unfolding automatically, but rather as subject to modification by intentional parental attempts to influence it. It was the philosophy of the intervention programme to facilitate such reciprocal developmental processes.

Although the structured section of the intervention programme is tailored to individual needs, and as such utilises the personal and economic resources available to parent and child, it is not necessary or indeed valid to assume negative effects from lower social class parents. Competent parents (White & Watts, 1973) will have the necessary level of functioning appropriate to their child despite socio-economic or educational background. The intervention programme was designed to be implemented with families of all social and economic groupings within the Canterbury region.

(b) Approaches to Infant Education

The developmental model viewed within the ecological setting forms the primary approach for structured education in cognitive, physical, social and language development. The programme is based on the cognitive-developmental research of Piaget, and also on the theoretical approach of Uzgiris (1976); Burton White (1971); Bruner (1968, 1973); White & Held (1966); Fowler (1977); Wolwhill (1970) (reviewed in Chapter 2). The organismic interactionist framework represented by Piaget allows the child systematically to develop significant cognitive strategies (e.g. object permanence) as well as the

developmental skills appropriate for later learning (e.g. directed hand reaching). For the purposes of this intervention model the Piagetian "thought develops out of action" approach is the primary focus. In addition, the work of the skill theorists such as Vygotsky was also considered when structuring individual language programmes for particular children. Jerome Kagan summarizes his view of the development of language in relation to thought in the opening years of life as follows:

> "The ability to recognise the past and to retrieve the past, and the ability to make inferences and to operate in a linguistic mode, all develop in a relatively orderly sequence. These competencies follow the schedules of maturation of the central nervous system. The child's rate of development which is genetically determined but also subject to environmental challenge determines exactly when these competencies will appear" (Kagan, 1980, p. 50).

From the Piagetian descriptions of sensorimotor intelligence we have identified tasks that are part of the young child's cognitive accomplishments during the first years of life. These conventional tasks also make demands upon the young child's physical abilities. There needs, therefore, to be a close correspondence between the child's increasing physical capabilities and his/her problem solving abilities.

According to Robinson & Robinson (1978):

> "One of the advantages of the Piagetian approach to cognitive development is that it provides us with a sequence of concepts rather than simply an empirical arrangement of tasks. Thus we have conventional tasks to use as operational definitions of the sensorimotor concepts of object-permanence, means-ends and causality. However, by identifying specific concepts we can then operationally define them in ways that involve accommodation of a task to a particular individual's response capabilities if the conventional criterion cannot be used" (p. 111).

It could be argued that this may well be the case with handicapped infants.

The behaviour being taught must lead towards a skill that enables the child to have additional control over his/her social environment, e.g. appropriate independent eating behaviour. The rationale for the emphasis upon increasing the child's control over environment stems from the growing body of literature on the topic of "learned helplessness" (Seligman, 1975). Robinson & Robinson (1978) state that after five years work with handicapped infants and toddlers this description (learned helplessness) frequently applies to situations in which we place these children. They therefore suggest that what is critical is that there be "a relationship established between a behaviour on the child's part and some predictable occurrence in the child's environment, both physical and social" (p. 112).

It is important to be aware of specific handicaps when planning instructional objectives. The best test always for skill generalisation, is to place the child in a natural situation where a newly learned concept is required to solve an immediate problem. It is with the successful performance under such conditions that we can have confidence in assuming the adequacy of the response as a generalised strategy.

(c) Counselling

As parent-effectiveness is the corner stone of home-based programmes, continuing awareness of individual and family needs must assume a vital part of the "working out" of the intervention programme. The interdisciplinary approach of the professional teams allows continuous monitoring of people's problems and anxieties. While some parents may be totally overwhelmed by having a retarded child, others cope constructively and grow as a result of their experience. It would be a serious mistake to assume that all parents of retarded children are emotionally disturbed. The most common patterns include the following and are described by Roos (1963).

(1) Loss of self-esteem

(2) Shame

(3) Ambivalence

(4) Depression

(5) Self-sacrifice

(6) Defensiveness

It was the philosophy of the interdisciplinary team that by a parent-professional partnership involving weekly contact, supportive listening, the working out of solutions to practical problems, and the opportunity to relate to others similarly affected, a climate was provided which was conducive to parents' accepting the handicapped infant as a worthwhile member of their families.

THE SEMI-STRUCTURED PROGRAMME

Introduction

No systematic data was obtained on the influences of wider social spheres. However, it is likely that the knowledge and understanding of D.S. which families gained from their involvement with professionals and other parents in the intervention programme helped to influence incidentally the networks which operate between family and community groups and between these groups and the overall value system of society.

Services Utilised in the Semi-Structured Programme

When designing the programme an attempt was made to assess the importance and availability of agencies within those settings which directly impinged upon the child and to include their function as an integral part of the programme. Appropriate utilisation of existing agencies was seen as strengthening the microsystem.

The following concerns were relevant within this context:

(i) Genetic counselling and ante-natal monitoring techniques such as amniocentesis

The availability of these services helped parents to feel less anxious when having further children. Assurances of a genetically normal infant reduce anxiety, guilt and the blame often displaced from one parent to another. Although these monitoring services were readily available it was considered necessary to incorporate and promote general awareness of these choices, to have a cytogeneticist visit the intervention programme and to show a film on chromosome abnormality and amniocentesis to new mothers and to those contemplating another pregnancy. The particular film chosen shows a step by step progression of the technique of extracting amniotic fluid from the abdomen of a pregnant woman, the aim being to reduce fear of the unknown as well as to inform (The Unborn Child - a New Dilemma. BBC documentary 1975 : colour).

(ii) Benefits and helping agencies

Support for the family unit was possible through the appropriate and timely use of benefits issued by the Social Welfare Department. An allowance of $8 per week per family (in addition to the family benefit) allowed mothers to avail themselves of services such as the family doctor, play groups, and to buy toys or equipment for their handicapped children without

feeling that these extra demands resulted in unnecessary financial burdens. Karitane Nurse help was available for 28 days per year as well as additional home help services obtained through the Social Welfare Department or the Intellectually Handicapped Children's Society. The professional team took responsibility for ensuring that all families knew which benefits they were entitled to and were encouraged to avail themselves of the services offered whenever they experienced the need for relief of family stress. As a consequence of having a financial benefit for the handicapped child, parents learned to use it to meet that child's special needs, e.g. early visits to the doctor to deal with such common conditions as upper respiratory tract infections to avoid the possibility of pneumonia and the ramifications of such an illness in a D.S. child. These include hospitalisation, heart failure and allergic reactions to drugs.

Personal growth, in addition to factual information on types of "help" services available to them, allowed families to meet crises or periods of family stress with appropriate support, e.g. a feeding problem (quite common in a D.S. infant) may have been quickly remedied by the prompt arrival of a Karitane Nurse or Home Aid helper. The support of a competent adult would frequently alleviate other stresses and

problems generated as a result of the initial feeding difficulty. It allowed those within the microsystem to maintain control over their own lives, to "overcome" a crisis and to function more fully again.

(iii) Referral Services

Although the specialist agencies (La Leche League, Dieticians, Orthopaedic specialists, Paediatric specialists, Cardiologists, Audiologists, Ophthalmologists and Geneticists) exist as such in the community, their services are often dependent on those referring the child. It is unlikely that any one D.S. child would require all such referrals, but it was the belief of the author that they must be pursued when a need arose. Through a professional sharing of ideas between the persons involved in early intervention and the agencies mentioned above, the aim was to facilitate a multidisciplinary approach to the care of the D.S. child. In the absence of the need for referral being recognised, parents would frequently initiate their own referrals in the belief that specialist help would benefit their children.

In order to foster professional co-operation and understanding, the members of the intervention team responded to all approaches to explain the programme

to medical and paramedical groups, to community agencies and to educational facilities. Visitors and students were welcomed to the intervention clinics and instructed in ways to observe the child and family. It was hoped by encouraging opportunities for learning and understanding the needs of the D.S. child and his/her family that such knowledge would generate more informed caregiving.

(iv) Parent Support System

The informal support network operated first between a new parent and another mother of a D.S. child, followed by continuing reciprocal interchange of one parent or parents with another. This mutual involvement was considered by Tompson (1976) to be an essential ingredient in successful intervention. Such a network enables those within it to reorder reality, to share stresses and anxieties with others who are intimately involved in the same process, to experience practical support and friendship, all of which give people the necessary personal skills to remain in control of their lives and attempt to solve their own problems (Tompson, 1976).

Implications for the Community of the Semi-Structured Programme

It was hoped that parents who were provided with opportunities to discuss problems and gain information with regard to the known facts of intellectual handicap within the intervention programme, might in turn effect a wider spread of information through, for example, the following settings.

1. an older sibling might choose to give a talk at school on D.S. and what is means to him or his family.

2. a parent might be asked to discuss the subject within a church or service group, following which support services such as babysitting, or joining in various aspects of the intervention programme might arise.

3. a parent might approach the local school to investigate the possibility of a child's future attendance there, following which an invitation might be issued for the Headmaster and S.T.J.C. to visit the intervention programme.

ASSESSMENT AND OUTCOMES OF THE STUDY

Introduction

It should not be argued that all quantitative methods in naturalistic research should be dismissed, but rather that a methodology be used which interferes as little as possible with the characteristics of the setting, and combines the most appropriate measures of both the qualitative and quantitative approaches.

Assessment procedures were an attempt to describe the children as they were functioning within their social and physical environments. The models of Cognitive Competency (Piagetian theory), Functional Intelligence (Bronfenbrenner, 1979) and Parent Competency (Baumrind, 1980) provided a framework for describing the child's variability of function across competencies as well as across time.

The measures employed in the study attempted to assess the functioning of the child and his environment in ways other than the much criticised single outcome measures (Zigler and Trickett, 1978).

The intervention programme acted on and effected change primarily on two microsystems, that is the family and the programme setting.

Assessment of the effectiveness of the intervention programme operated on two different levels, that is formal (data based) and informal (anecdotal).

Formal Assessment

Infant

1. Level of cognitive functioning
2. Sensory and neurological status
3. Level of physical skill development

Environment

1. Observational measures of the quality and quantity of caregiver interactions with the child

2. Observational/interview assessment of the child's home environment

3. Assessment (by questionnaire) of the mother's perceptions of herself as the teacher of her handicapped child.

The family microsystem of the D.S. infant was assessed with the above measures which attempts to avoid Bronfenbrenner's main criticisms of previous studies. These criticisms centered on:

(1) The Empty Setting;

(2) Ecologically Constricted Outcome Measures; and

(3) Focus on the Child.

(1) The Empty Setting

Assessments occurred in the home or clinic setting. An attempt was made to measure a number of features of the setting which might affect the developing handicapped child.

(2) Ecologically Constricted Outcome Measures

It was not possible within the confines of time or resources for this author to describe more than a limited number of influences affecting the developing child. Outcome measures were restricted to the cognitive functioning of the infants but observational and descriptive data were gathered at different points in time on the structures, roles and activities which occurred within settings. The latter are referred to as environmental measures.

An attempt was made to satisfy the requirements of ecological validity as outlined by Bronfenbrenner (1979, pp. 28-32). For example, the intervention team was known intimately by the research subjects and their families. Staff visits to their homes were accepted by the families concerned as friendly non-intrusive occasions. This is not to say that the assessment did not have any effect, as would be the case in a strictly naturalistic study. In fact, the information gathered was likely to be affected by the information given (for example, parent's knowledge of developmental milestones).

(3) Focus on the Child

Bronfenbrenner would argue that in contrast to the traditional unidirectional model of much laboratory based research, the ecological model must involve reciprocity. For example not only the effect of the parent on the child but also the effect of the child on the parent. The assessment measures used in this study attempt to explore these reciprocal two person relationships.

Limitation of the Formal Assessment Procedures:

It was unfortunately not possible within the confines of the present study to examine the range of possible environmental influences operating within the family microsystem of the D.S. child. Emphasis was placed on these aspects which seemed to be necessary to monitor the child's progress and interactions with the most significant caregiver. This, however, meant that other influences such as the father or other siblings had to be omitted. Also the influence of physical factors on the social processes which took place within the settings could not be included. No systematic data was obtained on the influences of the intervention programme on meso or macrostructures.

Informal Information

In addition to the formal data gathered by the procedures decribed above, informal information was also gathered by this author during the course of the intervention programme. This was largely anecdotal information about

individual family experiences of coping with the reality of a handicapped child together with their commitment to an intervention programme. Such information is reflected in the descriptive material contained in Chapter Six. As has been mentioned earlier it was hoped that family involvement in the intervention programme would generate a search for information on the growth and development of children (reflected in their dealings with subsequent children in the family), and an increase in the confidence and skill with which they communicated with other professionals, such as doctors, health workers and teachers. Communication would be aided by the increased use of professional vocabulary and concepts, aided by explanations of professional roles and expectations. In some cases the direct intervention of the staff as mediators between parents and other professions may be required, (for example, paediatric, hearing and eye clinics).

Summary of the Main Characterists of the Early Intervention Programme

The rationale for the early intervention programme attempted to take careful account of the essential requirements of ecological intervention outlined by Bronfenbrenner (1976, 1977, 1979). The planned sequential strategies of intervention endeavoured to maximise these requirements for the D.S. population. Although the context of this study looked specifically at intervention from birth to two years, the philosophy of the approach provides for

continuing and enduring parent-child growth through the pre-school years. Appropriately sequenced intervention strategies have been developed to continue the process of maximising the overall functioning of this group of children with the hope that they may have the opportunity to be educated alongside normal children within the pre-school and primary school systems. The necessity for the programme emphasises continuing intervention throughout the pre-school and primary school years, in accordance with the strong life-span position (Goldhaber, 1979) and the ecological model proposed by Bronfenbrenner (1979).

In summary the early intervention programme described in this study attempted to provide the following services on a continuing basis.

1. Information and training on how parents can devise and carry out developmental activities.

2. Advice on the management of health difficulties which are likely to be associated with D.S. such as feeding and diet.

3. Advice on the management of behavourial difficulties where necessary.

4. Accurate information on D.S. which includes causes, risk, rates, amniocentesis techniques, karyotype, mortality and short and long term prospects.

5. Information about local and national support services, both voluntary and statutory.

6. Advice to parents on how to use the services to meet their needs.

7. Liaison between parents and other services.

8. Provision of emotional support.

CHAPTER IV

RUNNING OF THE PROGRAMME

INTRODUCTION

The three target areas entitled "Structured", "Semi-Structured" and "General Context of the Study" will be outlined separately. Conceptually these areas must be viewed as an interacting interdependent whole. Intervention procedures in one part will affect the operation of all other systems in the unit.

THE STRUCTURED PROGRAMME

(i) The Physical Environment

The D.S. babies' clinic was set up in the Fendalton Plunket Rooms. It was open between 10 a.m. and 1 p.m. one morning per week, with the exception of primary school holidays. This location was chosen for two reasons. First, it was centrally located geographically, being on the main route to the airport, and was thus simple to find for families coming from country districts. Secondly, the rooms were offered free of charge for use as a community service. A morning session was chosen as the most appropriate time for parents to travel in with young babies, in order not to interfere with school or kindergarten placement of older siblings. The Plunket rooms though not ideal were adequate for our needs. The main room was large (17 feet by 30 feet),

well-lit and heated, with adjoining kitchen and two smaller clinic rooms attached. There were chairs around the perimeter of the room, carpet on the floor, one large table and one child's table and chairs. No appointment times were kept, the preference being to adopt a low-key approach where families felt free to come and go as they wished. The average amount of time spent by families at the clinic was one and a half to two hours. All families attended regularly, most managing a visit every week throughout the two year period of the intervention programme.

Although the clinic was closed during school holidays the staff were available to admit new D.S. infants to the programme or to aid families who required assistance with the programme during this time.

Morning tea was served at a mid-point during the session, and was organised by the local Plunket committee as a service to the clinic and as a way of involving their members with a section of the handicapped population.

(ii) <u>The Professional Component</u>

In addition to myself as the co-ordinator and researcher the following members were co-opted to work as an interdisciplinary intervention team on a part-time voluntary basis:- Speech Therapist, Paediatric Physiotherapist and a Specialist Teacher of the Handicapped. Conceptual agreement was reached between members, each person supplying,

controlling and having responsibility for her own particular specialist component, on a one to one basis with each D.S. child and his/her parent. Each team member was in fact highly qualified in her field, although the limitation to part time involvement was necessitated by family responsibilities. Performing these roles allowed these specialist people to undertake a professional commitment and to exercise their particular skills and abilities without the necessity of alternative care for their children. The amount of time each family spent with each professional during the clinic session varied for individual children. An average time of 20 minutes per person was considered usual. As children's needs varied according to whether they were experiencing growth "spurts" "plateaus" or "lags", so they may have required greater or lesser time with each professional. In addition, the child's current health, sleepiness, irritability, lack of concentration or parent's time commitments would have influenced the timme spent with each professional.

An outline of a typical clinic session was as follows:

10 a.m.
Family arrives and talks to other parents. Free play situation for child (and/or siblings) with clinic toys and equipment.

10 - 10.30 a.m.
Physiotherapist works with individual child on floor. Family sits beside therapist.

10.30 - 11 a.m.

Cognitive teaching takes place with therapist, parents and child at table.

11 a.m.

Morning tea. Opportunities for individual or small group discussions between parents.

11.15-11.45 a.m.

Time spent in discussion with speech therapist.

11.45 - 12 noon

The researcher spent time with each family before they left for the morning. This informal discussion was used to consider their child's progress, listen to, and help resolve anxieties or worries which related to their child and to provide verbal encouragemment for the worthwhile job they were doing.

(iii) Methods of Referral:

(b) Initial

As the intervention was designed to begin as early in the child's life as possible, co-operation of the Christchurch paediatricians in obtaining subjects was sought and willingly given. Referral was made to the researcher as soon as the diagnosis of D.S. was known. Time of referral varied from a few hours after delivery to approximately three weeks. The majority of children were informally referred during the first

few days after birth. The referral system usually proceeded in the following manner: following confirmation by the paediatrician of clinical diagnosis and informing parents of the opportunity to participate in Early Intervention Programme, a visit was made to the hospital by the researcher, where in conjunction with the paediatrician a meeting was held with both parents with the D.S. baby present. This time was used to explain more fully to the parents the services available for families with a handicapped child, followed by a closer examination of the child, describing the clinical features of D.S. to the new parents in an attempt to reduce their fears and anxieties of what such a diagnosis might mean. In summary the aims of this session were

(1) to expand the clinical information previously given and to offer reading material on D.S., and to discuss what having D.S. would mean for the child concerned and the family as a whole.

(2) to provide an opportunity for the expression of guilt, anger and sadness on the part of the parents within a supportive and counselling environment. Further meetings of this nature usually took place during the period of the mother's confinement within the hospital.

(b) Continuing Referral

During the period of the child's involvement with the intervention programme the following referrals were made.

(iv) Mandatory referrals for all children

(a) Auditory assessment

All children were screened by audiologists at the Christchurch Teachers' College Education of the Deaf Clinic at about nine months of age. Parents were present during the screening procedures. These included both Distraction and Impedance testing. Each child was seen individually. The total procedure lasted approximately 30 minutes. If the audiologist was at all uncertain of the child's auditory performance at this time a further referral was made to a consultant Ear, Nose & Throat specialist or alternatively arrangements were made for follow-up hearing assessments. Reports of results of testing were then sent by the audiologist to the child's General Practitioner.

(b) Vision:

At approximately one year all children were referred to an opthalmologist who fully investigated the visual acuity of the D.S. child. If there was any reason to suspect at an earlier age that a child was experiencing difficulty with vision then a referral was made immediately. Subsequent visits or arrangements for spectacles might have then become necessary, although all professional service to the handicapped child was given free of charge.

(c) Paediatric:

Each child continued to be cared for by the particular paediatrician who made the initial referral for intervention. As one pediatrician was in fact responsible for the majority of the children it was possible to set up six-weekly D.S. clinics at the Public Hospital in order that constant monitoring of these children's physical health could take place. Families attended these clinics as a group along with a member of the intervention team. As a consequence of these paediatric visits the following extra referrals sometimes took place within the hospital system.

(i) Paediatric Cardiologist (Any child with heart abnormality)

(ii) Paediatric Dietician (Weight problems)

(iii) Orthopaedic Specialist (Limb and joint abnormality)

(iv) Genetic Counselling (Usually effected when families wished to consider having further children)

(d) Dental:

Continuing individual dental assessments were made by a Periodontist on all D.S. children.

Records were kept on tooth eruption and condition of gums and mouth. If treatment was deemed necessary it occurred within the hospital system and did not involve any charge to the families concerned.

DESCRIPTION OF THE INTERVENTION PROGRAMME

General Aims

First, to provide a weekly opportunity for parents to further their knowledge of D.S. and of normal child development. Secondly, for them to learn the ways of interacting with D.S. children which would promote maximum growth and development in their own children. Thirdly, for parents to have an opportunity to support one another through a common concern for their D.S. children.

The interdisciplinary therapy model can be divided into the following areas for purposes of description: physical, cognitive, language, social and counselling. The first four of these areas relate directly to the level of functioning within the child, and the last one relates more specifically to the caregivers surrounding the child. Although each of these previously mentioned areas were separated for purposes of description it inevitably functioned within a mutually integrated framework (vid. figure 6:2).

1. PHYSICAL DEVELOPMENT

Intervention to promote maximum development of physical skills was considered a fundamental component of the programme. As has been outlined in Chapter 2, page 88, it is only through the developing of physical skills in the sensorimotor period that children learn about their world and become able to represent their experiences cognitively. It can be assumed that delayed physical functioning will inevitably result in delays in other aspects of development in D.S. infants.

General Aims

The goals of the developmental therapy programme for infants with D.S. were to:

(1) enhance normal patterns of motor development by facilitating normal muscle tone and inhibiting abnormal reflexes and patterns of movement.

(2) facilitate the use and development of righting, equilibrium and protective responses as a foundation for normal patterns of movement.

(3) provide tactile stimulation to increase body awareness.

(4) provide controlled experience of proprioceptive and kinaesthetic feedback through manipulation of body position.

(5) promote the parent's role as primary teacher and caregiver in the intervention programme. The model was based on the neurodevelopmental approach to treatment (N.D.T.) developed by Bobath (1965).

(6) provide appropriate oral exercise techniques to facilitate feeding and prespeech activities.

(7) prevent periods of arrested motor development which might be harmful for development.

(8) prevent the development of abnormal patterns of movement, especially the repetitive non-functional movements which might interfere with development of more advanced functional stages. (If allowed to become established these could produce changes in joint alignment and bone structure which might permanently affect posture, gait and general co-ordination.)

The theoretical importance of physical and cognitive development in the sensorimotor period has been outlined in Chapter 2, page 89. In addition it could be suggested that the increasing ability of the child to control his/her world with minimally delayed physical and cognitive skills would give parents reinforcement for their efforts in helping the child, as well as motivation to continue such help. This undoubtedly helped parents to feel more positive towards their handicapped infants and encouraged families to respond to those children as normally as possible.

Introduction to Method:

Development occurs in a cephalocaudal direction and proceeds from the gross to the more specific muscles. The infant develops head control before trunk and extremity

control. Posture develops first, followed by function. This orderly sequence and direction of development must be considered during teaching activities. Although generalised hypertonia is manifested in all major muscle groups, nuchal, trunkal and upper and lower extremities, individual differences will always be apparent and must be considered when planning developmental exercises (Hughes, 1971). The stimulation of motor development cannot be divorced from that of all other faculties. The aim was for an integrated single process of continual sensorimotor, intellectual and behavioural development, ensuring that there was no undeveloped skill at each stage. The following factors were considered important when executing the physical development sections of the programme.

(i) To express to parents the aims and principles of teaching handicapped babies clearly and simply in every-day language.

(ii) To observe and take account of the individual needs of each child and to provide a programme of individualised instructions.

(iii) To ensure that the suggested programme was well within the individual mother's capacity and made sense to her within the context of her everyday world. At no time should she have been made to feel inadequate. The aim was to restore confidence in her ability to cope adequately with her child's continuing physical

development. Alternatively, there was a need to dissuade mothers from becoming too over-protective towards these infants.

(iv) To provide an opportunity each week, in a relaxed informal setting, for teaching skills (through guided instruction and observation) appropriate to the child's level of development.

Method and Procedures

The therapy sessions took place on the floor of a well-heated room, on a one-inch foam mat covered with sterile towels, which were used and replaced for each child. The mother undressed the child to the vest to aid her observation of what the objectives of therapy were, e.g. the visibility of muscle groups and the feel of the infants muscle tone.

Parents' repeated the procedures shown them by the physiotherapist, and any modification of their actions took place during the session. Parents participation was socially rewarded as their actions approximated those demonstrated to them by the therapist.

When babies first entered physiotherapy sessions at approximately two weeks of age, the following general topics were discussed with families.

(i) The importance of early prone lying. This position is advantageous in allowing the smooth development of many functional patterns and may be undertaken for brief periods from birth, increasing as head control is obtained.

(ii) The necessity for a firm flat mattress in the infant's bed to facilitate the prone position.

(iii) The important of dressing the infant in closely fitting garments to avoid the continuance of such behaviours as reflex grasping of ill-fitting sleeves, or the inability of the infant to experience the effect of digging feet into the surface beneath. Leg movements are restricted by overly long garments.

(iv) The holding and carrying positions were demonstrated by the physiotherapist. The advantages of using "front pack" baby carriers were described, as were lifting procedures for minimising the startle reflex which may persist in these babies.

(v) The developmental checklist (vid. Appendix A) was shown and explained to mothers and reading material relevant to their babies level of development was given (vid. Appendix A).

The following is a range of activities which therapist and parents promoted at particular points in time. In the case of babies beginning the programme, it was suggested to parents that they perform the range of exercises every time they changed anappy (up to 3 to 5 times daily). The length of time spent doing the exercises would necessarily depend on the co-operation of the infant. A general guideline would be between one and 5 minutes. Time of day was not important.

It was ultimately the parents' decision as to which or any of these activities they managed to incorporate into their daily living. Each child's rate of progress varied, and the timing of the introduction of activities primarily depended on the previous skill level of the individual child, so that the ages given are only a guideline.

One Month

Possible activities for promoting motor development were discussed with parents as the child progressed and procedures demonstrated by modeling. The sequence of developmental milestones was explained to parents, as were the specific steps needed to reach each milestone. For example, the steps necessary to develop head control are:

(i) side to side head movements
(ii) holds head steady when carried
(iii) lifts head 45° when lying on stomach
(iv) lifts head 90° when lying on stomach
(v) raises and turns head lying on stomach

(vi) pulls to sit, no head lag

Head control in the infant is a prerequisite behaviour for subsequent skills such as sitting, crawling visually directed reaching. The importance of the following areas were also discussed with the parents at this time. Changing body position frequently, e.g. prone, side, supine, sitting, standing. With baby lying on the back, putting hands against the feet and pushing gently; if baby resisted push, releasing pressure and allowing him to experience the feeling of movement. Changing surfaces on which baby lay to allow the experience of differing textures, e.g. rough towel, slippery satin. Encouraging head-lifting in prone and sitting positions by talking, stroking muscles from behind base of neck. Strengthening of neck and shoulder girdle by pulling baby to sit using first shoulders and then hands. Attempting to gain attention with rattles, squeaky toys, etc. Parents were instructed to carry the infant in an upright position towards their bodies for maximum extension of spine and resultant opportunity for head lifting. As head lifting occurs, a greater opportunity exists for eye-to-eye contact between mother and infant, together with smiling and vocalising from mother to child. Parents were rewarded by observations of their infant's efforts towards a desired goal. As families had elected to participate in a parent-based programme

they were motivated to carry out suggestions made by the therapist. Using of front pack to allow infant to accommodate self to mother's body as she moved about.

Three Months

Encouraging a greater range of head control. Give practice in turning the head to both sides in all positions, praise child for turning head, present an object to attract child's attention squeaking or moving object to retain child's interest. Prone head lifting to 45° and 90°. While sitting, holding head steady for 30 seconds when held towards parent's shoulder. (In this position the infant should support head and neck.) When standing, encouraging weight bearing by bouncing infant gently on feet. Encourage rolling from side to back. The therapist showed mother how to position baby and prompt the expected behaviour by allowing baby to move in an off-balance position to supine lie. When in prone position the therapist promoted pushing up with arms to allow chest off ground, using toys, mirrors, bells, human interchange as means of executing skill. Continuing to work for a decrease in head lag using only arms to pull from sitting was aimed at. Continuing range of body positioning and appropriate carrying of infant. Continuing more extensive pushing of alternative feet when in prone, and shaking of hands to obtain open position before placing in prone. During the first

few months parents are shown how to use a small 40 centimetre plastic inflatable ball to roll their infants upon, to stimulate head lifting, righting, and equilibrium reactions, feelings of feet on the ground. Balls were available to lend to families whose children attended the programme.

Six Months

Encouraging greater head control when in sitting and in prone. Promoting self-supported sitting together with opportunities for head lifting and control. Weight bearing on hard surfaces encouraging active bouncing up and down. Holding on to mother's hands whilst standing still. Positioning of baby in crawling position, mother lifting to hands and knees position by use of folded nappy under abdomen. Positioning toys out of reach to encourage 180° reaching from prone position. Encouraging rolling from supine to prone using small steps and shaping techniques.

Nine Months

Consolidation of independent sitting skills, opportunities for rotation in sitting (the importance of which is demonstrated by Lydic & Steel, 1979). Use, when sitting and standing, of balance boards with gradations of movements. (First board used has minimal movement when sat on by child; second and

third boards have increasing movement). Walking carts were used to encourage standing and holding on, as well as forward movement of the legs in a walking sequence. The carts were frequently weighted at this stage for greater stability.

Therapist or parent helped child to get from sitting position to crawling position and back again to sitting. Encouraging forward movement when in prone position by pushing on feet whilst bending opposing knee, mother working child forward, releasing pressure if child made appropriate voluntary movement.

Holding child by fingers when being pulled from sitting to standing, encouraging upward position by talking and lifting.

Promoting standing against furniture as well as giving infant pattern for pulling self to stand. Encouraging flexibility by providing wide range of opportunities for attempting skill, e.g. against mother's body, cot, large therapeutic rolls or cubes.

Twelve Months

Consolidating and encouraging greater flexibility of the skills used at the nine month period, e.g. sitting, standing, walking behind pushcart, promoting good knee bending to minimise straight leg walking. Rolling around floor, moving forwards or backwards, pulling to stand, encouraging rotation of trunk and head, balance reactions. Learning to move over or

around small obstacles and greater awareness of hands and knees position for crawling to promote strength in arms and shoulder girdle.

Eighteen Months

Encouraging the use of mobility on all fours. If great difficulty was experienced in obtaining this position a prone trolley was used to support trunk allowing arms and legs to move in crawling pattern.

Encouraging child to pull to stand, and rotate in this position in a wide variety of situations. Walking first with two hands held, then moving to one hand held, culminating in independent walking. Sitting skills were extended to include use of a small chair, beanbag, large soft toys. Small "ride on" toys were mastered at this stage. (They needed to be appropriately balanced and allow the child's feet to reach the floor). Mothers taught their toddlers how to cope with steps and paths and how to climb over or on to objects in and around the home. At this age a greater range of outside activity became possible and families were encouraged to use every opportunity both inside homes and outside (their own or other people's), public playgrounds or beaches for widening and consolidating their child's physical skills.

Summary of Physical Development

Intrinsic Difficulties

(i) The reduced level of curiosity and initiative in the D.S. child lessens the driving force which normally keeps a child's motor development moving easily from one level of development to the next.

(ii) The achievement of every new pattern of posture and movement appeared often to be an effort. It was integrated with difficulty into the familiar repertoire and it appeared that, without repeatedly showing the child by positioning, any execution of motor skills might have been needlessly retarded.

(iii) Although some delay appeared inevitable, all children would have their own optimum rate against which individual expectations could be judged when participating in the physical therapy programme.

(iv) Home visits might be necessary for some families, and if required, arrangements were made for intervention or assessment to occur wherever the child happened to be.

2. COGNITIVE DEVELOPMENT

General Aims:

(1) To develop an individualised programme for each infant which effected an orderly progression of

hierarchically ordered and horizontally integrated sensorimotor skills and which could be measured both formally and informally.

(2) To provide opportunity for the child to learn about objects, first by developing skills needed to explore those objects, and secondly to learn about the functions of those objects.

(3) To provide the caregivers with the requisite teaching skills, knowledge and enthusiasm for developing and usefully maintaining cognitive skills within the child's everyday world.

Specific Objectives, Method and Procedures

Introduction:

A suitable way of representing the tasks of the sensorimotor period is to divide them into the following general areas, and then to describe the behaviours within these areas. In this way the underlying mental activities or structures which the behaviours represent are more immediately apparent. Teaching methods used in all structured intervention were sometimes those of the precision teaching model, as outlined by Neisworth & Smith (1973) in their book "Modifying Retarded Behaviour". The principles of precision teaching involve the elements of both the antecedents and consequences of behaviours. Teaching of specific behaviours involves breaking the task down into a progression of small

steps, together with adequate instructional prompts. Sufficent reinforcement must be given at each step to sustain motivation. The technique of "fading" involves gradually removing instructional prompts as they are no longer required. That is, evidence of the learned behaviour is apparent.

Adult modelling (therapist to parent) was also used during structured intervention. Modelling involves watching other people perform appropriate behaviours.

The following examples illustrate the principles of precision teaching as they applied to the teaching of specific cognitive skills.

1. Breaking the task down to a progression of small steps.

Task

Following a moving object through an arc of 180° horizontally.

Choose brightly coloured interesting toy e.g. squeaky red animal. Child should be positioned with head erect.

Step I

Adult to hold toy six to eight inches in front of child's face and say "look"

Step II

Child fixates eyes on object.

Step III

Whilst child fixates object adult moves toy slowly to either right ot left, continuing the horizontal movement until child loses focus.

Step IV

If child loses his/her focus of the object it is returned to the mid-line position and task is repeated. The adult attempts to extent the child's range of visual following to 180°.

2. The following examples ("looking at an object") illustrate the procedures of "response shaping", "fading", "instructional prompts" and "reinforcement".

Step I

Adult holds up rattle shaking it and says "look" (instructional prompt)

Step II

Baby looks (positive response)

Step III

Adult smiles and says "good" (positive reinforcement)

OR

Step I

Parent holds up rattle, shaking it and says "look" (instructional prompt)

Step II

Baby doesn't look (negative response)

Step III

Adult repeats "look" and physically turns baby's head until eye contact is made (shaping)

Step IV

Baby now looks (positive response)

Step V

Adult smiles and says "that's right, now you're looking" (positive reinforcement)

OR

Step I

Adult holds up rattle shaking it but does not give verbal cue (fading)

Step II

Baby looks (positive response)

Step III

Adult smiles and says "good" (positive reinforcement)

Because children were seen at the clinic only once a week, not all steps as outlined in the examples were necessarily taught, as some may have occurred as incidental learning during the days preceding their contact at the clinic. Alternatively some parents may have aided their child to complete subsequent stages of a task of their own volition. Reinforcers suggested for use with infants included praise, kissing, cuddling, smiling and tangible rewards such as food, drink (usually for infants over six months of age).

Behavioural techniques as outlined above were strictly adhered to, only on an occasional basis. Many parents expressed very negative feelings towards a rigidly behavioural structure, and such techniques were most often used with parents who had little understanding of their child's developmental needs or for infants who had failed to acquire a skill through less direct techniques or through experiences of informal play.

Cunningham & Sloper's (1978) broad outline was used in the intervention programme. It was as follows:

Visual and Auditory Discrimination:

The use of the eyes and ears.

Manipulation:

The way in which the infant uses hands to manipulate objects.

Reaching:

The development of the ability to reach out towards an

object.

Grasping:

The ability to pick up and hold an object.

Attention Span:

This begins with the ability to attend to only one object at a time, then gradually extends to the ability to attend to two and three objects. Increasing ability to direct attention to things for longer periods of time.

Permanence of Objects:

For the young baby objects cease to exist once they are absent from view. Gradually the infant begins to look for things dropped, and then for hidden objects. As memory develops the infant beings to find things after longer delays.

Exploration:

The exploration and examination of objects, involves the baby in opportunities to learn about his/her world.

Relation of Objects:

The development of the baby's ability to use two or more objects together.

Problem Solving:

This involves the child's ability to see the relationship between objects and to use an understanding of this relationship to achieve a meaningful result.

Imitation:

The infant's ability to imitate actions of others.

Discrimination:

The infant gradually learns to see the difference

between objects and to use each appropriately.

Eye-Hand Co-ordination

This skill follows reaching and grasping and relates to the infant's ability to perform fine motor movements.

Description of Adaptive Behaviours of the Fine Sensorimotor Period:

Assumptions

When describing the development of these adaptive behaviours, it would seem more appropriate to view them sequentially rather than age specifically. As has been previously mentioned any reference to age must of necessity be a general approximation within which individuals will vary for a variety of reasons. When considering the evolution of cognitive behaviours in the sensorimotor period, it was necessary to be concerned with how they related directly to the level of physical competence achieved by the child.

In this section of the intervention programme it was assumed that development would be delayed. The programme aimed to promote the development of all facets of cognition, rather than waiting for a gap to occur. This might mean that a child was working to acquire a whole range of behaviours concurrently on the assumption that the sequence of acquisition might vary for individual children. It also permitted a breadth of approach where a child was not required to mark time before proceeding to a new skill area, if in fact a particular skill appeared somewhat delayed.

0 - 3 Months

This period of time involved the infant in a shift from reflexly instigated behaviours to more cerebrally controlled movements. Key issues for the infant were co-ordination of ears, eyes and hands. The caregiver spent time with a specialist teacher of the handicapped in a continuing dialogue aimed at guiding her in methods which would promote these skills. The first task required of the caregiver was to teach the infant to fixate on an object. The therapist encouraged this skill at the same time as she was promoting head lifting and control. Whilst the child was helped in an upright position the therapist suspended a brightly coloured toy or rattle six to eight inches from the infant's face and observed when the infant focused on it. It was suggested at this beginning stage that this activity should be attempted when two persons were present in the home. One person was able to watch for focusing behaviour whilst the other manipulated the stimulus object. Looking at faces is an important activity in the early weeks (Fantz, 1961). The person caring for the child was encouraged to hold the infant in positions where eye-to-eye contact could occur and to provide opportunities for the child to look at his/her own and other people's faces in a mirror. For example, mobiles, pictures of faces (either in black and white or primary colours) with clear outlines were given to parents to be used whilst promoting looking behaviour in their children. If the infants were to use the eyes effectively they had to learn to follow an appropriately positioned moving object to midline, whilst lying down. They

had then to extend their visual range further to 180° whilst lying and sitting and track a moving object horizontally and in a circle.

Developing the child's abilities to respond to sounds differing in pitch and intensity was discussed during the clinic visit. The importance of ensuring that the child could transfer from a visual to an auditory stimulus was stressed and parents were shown how to attract their infant's attention using a rattle or small bell. If the infant did not respond they were shown how to take the child's head between the palms of their hands and working from behind, gently turn the head to the source of the sound emphasising the auditory stimulus as it came into the infant's view. Shaping and fading procedures (as previously described) were used to move the child to a position where he/she was able to execute the skill unaided. In order that flexibility and horizontal transfer of skill might occur a range of auditory stimuli were described and ways in which they might be used were discussed. For example, voices might be used in a variety of ways (loud, soft, whispered, singing) when talking to the infant.

Whilst developing visual and auditory skills parents were shown how to promote maximum opportunities for directed hand-reaching whilst the child was awake and alert. Discussions focused on touching and grasping behaviours, for example providing the infant with a wide variety of textures to experience with his/her hands and body, through use of

coloured cellophane, materials, objects and toys. Bath-time was also a learning experience, with provision of opportunities for splashing sensations, grasping a wet cloth, and pushing floating toys in water. Parents were shown how to observe the quivering of the children's fingers as they made their first attempts at touching an object. Following this, techniques for shaping and fading (as previously discussed) were taught to allow the skill to develop further. During the early weeks the clinic session did not usually involve a great deal of structured teaching in cognitive skills; rather it was a time of two-way discussion whereby mothers learned ways in which they might achieve the required objectives at home. Books, structured materials and nursery equipment were lent to parents to aid their teaching.

Equipment Used

(1) Notebooks in which parents wrote the week's therapy programme including ideas for implementing the behaviours demonstrated.

(2) "Maral" Baby carriers.

(3) "Mothercare" infant seats.

(4) "Fisher-Price" range of infant toys and play materials

(5) Selection of soft toys, rattles, mobiles, play-gyms.

3 - 6 Months

From approximately three months of age a more structured programme of learning began for the infant and caregiver. The clinic session now included a period spent at a table with the teacher. This is a procedure parents were advised to use at home when first teaching a new skill to a young baby. It also served as a useful routine for gradually increasing the length of time for which an infant would concentrate.

Once head control had been established and reflex grasping diminshed, the following skills were taught using techniques of precision teaching:

visual fixation of object on table;

shift of visual focus from one object to another;

response to auditory stimuli whilst visually fixating on an item;

manipulation tasks including bringing hands together, grasping objects purposefully, holding two objects simultaneously, raking and obtaining small object on table, shaking rattles, mouthing objects, crumpling paper, banging objects on table, knocking over toys and looking for a dropped object;

consolidation of visual and auditory tracking, with emphasis on ability to perform these skills with a variety of objects in a number of positions, e.g. sitting, lying on tummy, lying on back and whilst placed on side.

Parents learned the techniques for teaching their infants by first watching the teacher demonstrate steps in the acquisition of a skill with a child. The infant sat, supported by a cushion, on the teacher's knee at a table while parents observed the progression of stages necessary to acquire a particular skill. For example, when demonstrating the sequential stages of acquiring the skills of "pincer" grasp the following steps were outlined. Not all children required specific instruction in each stage.

(i) The infant seated on mother's knee at a table. The infant's body needed to be close in to table enabling elbow and forearm to rest on table top.

(ii) One object to be placed on table. The infant must be as free as possible from other distractions. A suitable object for beginning the instruction was a half inch cube of bread. The slightly spongy nature of the bread allowed a child to grip without his fingers sliding off. The bread could be spread with vegemite or a similar substance familiar to the child.

(iii) Mother first demonstrated the properties of the bread by picking it up, looking at it, naming it and putting it down.

(iv) Mother then took the child's hand enclosing her hand over the surface of the infant's fingers, leaving only the infant's thumb and first finger exposed. Mother then moved the infant's fingers into a position on the cube of bread and lifted it up. The infant needed to be visually attentive during the task.

(v) This procedure was repeated at appropriate intervals during the day. As the child showed ability to lift the bread when his/her fingers were brought to it by the mother she gradually released the control she had over the other fingers and allowed the child to complete the skill unaided.

(vi) Ability to use the finger thumb skill needed to be exercised on a variety of objects with differing properties. Practice could occur during meal, bath or playtimes.

(vii) As with instruction in any skill the, infant should be encouraged to explore the objects used in specific teaching sessions in a free play situation. Knowledge which involves understanding is retained better and has much wider transfer and application (McConkey, 1981). The focus of any instruction must be

"process" centered rather than "product" centered. Recent reported research studies on D.S. infants by McConkey (1981) suggest that children who were allowed to "play around" with the materials tackled the task more successfully than children who were given only specific instructions for solving the particular problem. If demonstration of existing skills was required then this would always be first demonstrated by the parent for the teacher to observe the child's level of competence and to assess the parent's grasp of what his/her role as teacher involved.

Summary of the Behaviours of the 0 - 6 Months Period

During the first six months of life children become able to co-ordinate information from the various sensory modalities and integrate it as though the different modalities were sources of information about the same objects rather than unrelated ones. Thus they extend their first reflex patterns through experience to acquire new schemas with new end results.

6 - 12 Months

The infant's cognitive abilities were extended during the period to include the acquisition and consolidation of the following skills.

Eye-Hand Co-ordination - Examples:

Reaching for object with one hand; reaching for and picking up two objects - one with each hand; holding object to manipulate, (for example, deliberately shaking a bell or rattle whilst watching its actions); pointing to pictures in a book; watching the activities of others at a distance of three to five metres; holding a crayon and attempting to scribble; transferring objects from hand to hand; picking up objects using thumb/finger grasp; using finger to poke objects; removing cloth when it was placed over the face.

Problem Solving - Examples:

Looking for dropped object easily and purposefully; ability to obtain an object by pulling a string when it was held out, e.g. a ring with a string attached, extending during this period to infant grabbing string personally in order to obtain object; opening a box to find object; looking under blanket to find toys.

Summary of the Behaviours of the 6 - 12 Months Period

The child began to discover the permanence of his/her world, rediscovering objects which were partially invisible or had disappeared from view, and might have been displaced from where they were originally observed. This stage of infant development was characterised by the use of one schema as a means to

an end. The specialist teacher attempted to prepare the child for a smooth transition to this stage by promoting in him/her a wide range of well practised schemas which were flexible enough to allow the child to broaden his/her behavioural base.

12 - 18 Months:

By the time an infant reached the end of the first year balance in sitting was well established and clinic work now took place with the child and specialist teacher sitting at a child's table. The parent usually sat behind or beside the child. Cognitive activities of the previous period continued to be consolidated and new ones introduced. The tasks of the 12 to 18 months stage of development included the following:

Eye-Hand Co-ordination:

Use of both hands freely to manipulate objects. Putting objects in and taking them out of containers. Making a tower of two or more blocks. Putting rings on a stick. Placing pegs in pegboard. Putting shapes in a form board. Making drawing movements with crayon on paper. Putting lids on and off boxes.

Problem Solving and Memory:

The child was expected to look in the correct place for a toy that had rolled out of sight. Recognise

members of the family, including animals, and watch their movements from a window or door. Reach behind a screen to obtain object. Solve problem of what to do with third object when already holding one in each hand. Remember where shoes or toys had been put. Work for toys out of reach by removing distracting objects from his/her path.

Summary of the Behaviours of the 12 - 18 Month Period:

The central feature of the child's cognitive behaviours at this stage focused on his/her ability to invent new behaviour patterns. The Piagetian term "Tertiary Circular Response" decribes the kind of repetitive behaviour that engages and fascinates the child. Actions by the child are essentially variations of already existing schemas made more adaptive and more useful as a tool for problem solving behaviour. By the end of this period greater progress in the development of the object concept should have occurred.

Factors Affecting Cognitive Intervention

Circumstances which might have affected the expression or direction of intervention, particularly in the early weeks or months, included the emotional and physical health of the mother and the physical health of the infant. The amount of structured teaching

which took place during the early weeks depended upon individual differences in infants, e.g. level of alertness, and also on the previous experience of the caregivers in handling young children. As a consequence of this the nature and amount of structured teaching and time spent in discussion necessarily varied to meet individual needs.

3. LANGUAGE DEVELOPMENT AND SOCIAL DEVELOPMENT

General Aims

(1) To promote an optimum level of responsiveness in the D.S. infant whereby pre-verbal and verbal behaviours could become functional components of the overall development. This meant that the child used language, first as a pre-verbal pleasurable experience of repetitious sounds, secondly as a means of expressing needs and wants, and thirdly to structure cognitive processes in more complex ways.

(2) To ensure that the infant achieved a level of receptive language commensurate with other areas of development.

(3) To promote the development of appropriate social behaviours in human interactions, e.g. eye contact; ability to attract attention verbally; smiling; appropriate distancing of persons engaged in interactions.

(4) To foster the development of play, including imitation and imagination.

(5) To ensure an age appropriate level of competence in self-help skills such as dressing and feeding.

Assumptions

The development of language (both expressive and receptive areas) and the development of personal and social skills will be described together.

Within the Early Intervention Programme it was the speech therapist's role to provide the parents of the D.S. child with the necessary skills and information whereby they might facilitate the development of appropriate child behaviours. As speech is primarily a cognitive function involving expressive social interaction, it seemed valid to group the previously mentioned skill areas as the primary responsibility of the speech therapist. Nevertheless any intervention procedures were always viewed by her as part of the wider processes of growth and development.

Method and Procedures:

During their weekly visit to the intervention clinic families spent about 15 minutes with the speech therapist. This normally involved one family at a time, although on occasion two mothers might share a session if their children were close together in age and development. The time spent

normally included a two way discussion, focusing specifically on the skill areas of the children concerned, but also provided the context within which the parent might view these areas as important aspects of overall development. Such discussions formed part of a continuing teaching process which was expanded and modified with the parent as the child's development proceeded.

In discussion with the speech therapist parents would be made aware of the foundations of language, for example

(i) sounds - children must be able to make a variety of sounds, and use their voices rythmically.

(ii) hearing - children need to be able to locate sounds, and to attend to the important cues.

(iii) imitation - children need to be able to copy not only the actions of others but also the sounds and sound patterns.

(iv) imagination - children need to be able to "make believe".

(v) object recognition - children need to be able to recognise objects in unfamiliar places, as in finding hidden objects.

An explanation of the developmental sequence of language development was also given to parents by the speech therapist.

Techniques for encouraging language development:

The development of language in the young D.S. child is an individual process which relates primarily to each mother/child unit. Communication is a personal experience within this relationship. The speech therapist's function was to take account of each families' parenting style when suggesting activities for encouraging language.

As has been mentioned for both motor and cognitive activities not all families were happy to respond to a strictly behavioural programme for the attainment of skills. Parents who were inexperienced or lacked a basic knowledge of children's behaviour were shown more specifically how to engage their infant in language stimulating activities, for example, showing infant a simple picture book.

(i) Choose book with one clear picture per page (Ladybird series)

(ii) Have infant on mother's lap holding the book with one hand

(iii) Take infant's other hand and pat picture naming the object clearly and slowly.

(iv) Talk about the picture to infant, relate it to his experience.

(v) Mother bends her head towards child and labels picture again so child can see mother's lip movements.

Behaviours of the 0 - 6 Months Period:

The following areas of development were covered during the early months of the child's life.

First, help and information may have been needed to establish and maintain satisfactory feeding techniques with the new-born D.S. baby. Mothers were encouraged by their paediatrician to breast feed and were given help and support to achieve this end. Guidance came from the La Leche League, from the speech therapist and from literature she gave parents to read. If an infant was to be bottle-fed help may have been needed in providing the American designed "Nature-Flow" bottles and teats which enabled the child to feed more satisfactorily. If bottle feeding, the mother was shown how to exert intermittent pressure under the baby's chin whilst he/she was sucking to encourage him/her to keep his/her mandible in a forward position. As sucking is a frequent occurrence in the first six months of life, mothers were shown how to hold their child to maximise opportunities for social interaction, e.g. maintaining eye-to-eye contact, mother to smile and laugh, to make "faces", gestures and to sing to his/her infant whilst feeding. These activities should occur, not only when infant was being fed, but whenever he/she was in contact with other people.

Whatever noises an infant made would be imitated by those around in a face-to-face exchange. Mothers were encouraged to talk to their babies, describing rooms they were in, or activities taking place. The child's clothing and body parts were named for him/her as a continuing process of providing a wide range of satisfying comunication experiences. The development of smiling was also encouraged by these activities. Similarly, laughing aloud would be encouraged by the mother's gently stroking and pushing the infant's mouth into the smiling position whilst she was talking.

As well as face-to-face contact mothers used mirrors to arouse awareness in their infants. The parent might hold the child to a mirror talking to the reflection and also take the child's hands and pat his/her own reflection. Alternatively, whilst on the floor in prone, a mirror might be strategically placed whereby a child could regard his/her own image whilst lifting the head.

As the ability to laugh out loud at curious or novel events is considered to be an important intellectual skill (Cicchetti 1978) training in this area began during the first few months and continued throughout the intervention period (vid. Appendix B). Parents were given a copy of the activities listed by Cicchetti and ways in which they might use them at home were discussed.

A range of activities for encouraging development can be found in "Let Me Speak" (Jeffree and McConkey, 1976), (vid. Appendix G).

Behaviours of the 6 - 12 Months Period:

The precursors of expressive language were developed during this period, beginning with a greater quantity of vocalisation and the emergence of babbling. Those interacting with the child were encouraged to babble back to the child and engage in intensive periods of vocal play, including variations of intonation, imitations, repetition and rhythm. Nursery rhymes, jingles, finger plays, ball play, simple stories and listening activities were used to encourage speech and language. The infant was rewarded with verbal praise, hugging or smiling if he/she showed any sign of communicating needs, pleasures or dislikes, or any expressed signs of anticipating an event or activity, (for example, a familiar nursery rhyme or action song such as Row, row, row your boat; Round and round the garden; or Peek-a-boo). Imitation and discrimination were important aspects of intellectual development during this period. Activities which promoted these skills were encouraged by the speech therapist as well as by other professionals involved with the child (vid. pp. 55-59 "Let Me Speak" by Jeffree & McConkey).

The control necessary for self-feeding skills began during this period. Activities initiated during this stage were intimately linked with all aspects of development, e.g. blowing and sucking skills aided the articulation of speech sounds and helped when eating more solid foods and drinking

from a cup. Such activities also provided opportunity for play and social interaction. Independence in feeding and drinking was encouraged as early as possible. The infant was given opportunities to hold a crust or biscuit, to use a cup from approximately 9 months and to make attempts to feed with a spoon from about 12 months. Other social skills such as dressing and waving goodbye, were part of the speech therapist's curriculum. As with all areas of intervention involving the professional team, the parent kept a weekly notebook of the child's progress with suggestions for implementation of skills at home and in the community. (vid. pp. 48-49 "Let Me Speak" by Jeffree & McConkey).

An introduction to rhythm, intonation, pitch etc, were begun during this period using a variety of musical instruments. For example, a xylophone was used to tap out babbling rhythms, bub-ba, mum-ma.

Behaviours of the 12 - 18 Months Period:

The speech therapist's programme continued to involve the child in further expansions of all the skills acquired in the preceding stages, i.e. listening, hearing, imitation, play discrimination and growing independence in feeding, dressing.

Babbling behaviours would expand into more meaningful expressions, and begin to attach themselves to people or events in the child's world. During this period the aim was for single words, pointing and vocalising, to indicate needs,

food, familiar people or things. The speech therapist would begin to develop a picture scrap-book with the family to assist with the teaching of nouns which related directly to the child. The scrapbook provided a general focus for the parents when directing speech and language experiences. Any picture used in this way needed to be physically represented in the child's world and the real object used both for language and play experience, e.g. family, cat or dog, shoes, gumboots, food, clothing.

An important aspect of the speech therapist's work at this time was to help families understand the important non-verbal aspects of communication and the necessity for teaching these as an integral part of language and social development. All this is taken for granted in normal children and it was our experience from specific observation on older D.S. children that an inefficiency in this area inhibits the development of successful communication. These behaviours include the appropriate use of the following skills:

(i) Eye-to-eye contact.

(ii) Appropriate distancing from another person when communicating.

(iii) Give and take of items such as toys or books in social interchange.

(iv) Appropriate use of gesture.

As with all aspects of the early intervention programme the objective was to prevent a "lack" becoming apparent rather than attempting to ameliorate a condition which might not become apparent (as in the case of communication) until kindergarten age.

During the second year the speech therapist was concerned with the development of imagination in play. It appeared from observation that this area did not develop naturally in D.S. children and should therefore be specifically encouraged at the stage at which normal children display imaginative behaviours. Ways in which parents might promote this area of their child's intellect were discussed and described. For example, giving names to toys, encouraging the child to perform tasks for "Teddy", e.g. washing, feeding, hat on or off, putting to bed. Another method involved the child in simple dressing-up procedures, using for example, a hat or a bag. Parents might have to actively teach and reward their children in this area as their ability to make believe in play seems to be slow to develop. As part of imaginative play body image might also be taught. Awareness of eyes, ears nose etc. might all be included in play situations using the child's own toys.

Listening, language and play continued to be incorporated in group musical activities where each mother worked with her own child. Overall direction was exercised by the speech therapist who involved any parent with musical

interests as the key figure in the group activity. Instruments used included drums, tambourines, clackers, shakers, xylophones.

Factors affecting cognitive intervention:

(i) During the 12 to 18 month period normal children markedly increase their physical mobility. As the milestones of D.S. children are almost always delayed many of them may not have acquired movement skills during this period. Care needed to be taken to expand thinking, language and social skills despite this apparent immaturity in physical development.

(ii) Families had to be made aware of the need to dress their children in age appropriate clothing despite their smallness of physical stature and motor immaturity. Expectations should always be for positive personal growth and development. Restricting the child within the stages of infancy by virtue of unsuitable clothing and delayed motor skills was not encouraged.

(iii) The development of auditory impairment due to middle ear problems during the second year of life is not uncommon in D.S. children. The

speech therapist would have cognizance of this possibility, and act accordingly should this difficulty present itself.

(iv) Although dentition is usually delayed or irregular in D.S. children, it is important to encourage parents to proceed quite normally in terms of range of foods given and expectations of independence in feeding. In the absence of teeth, gums can adequately be used to masticate food and indeed the use of the maxilla will aid in the eruption of subsequent teeth (Sicher, 1949). The aim was to avoid continued spoon feeding of pulpy foods to children well past the developmental age where it is considered unacceptable to others.

Factors which were considered in the Structured Teaching of the Intervention Programme

The content, methods, and objectives of the intervention programme were not considered to be fixed and impervious to change. The professional team was involved in constant reassessment of both their roles and those of the recipients of intervention, that is, the child and his/her family. Changes in the programme occurred from time to time for reasons of a practical nature e.g. ease of execution, economy of effort or alternatively changes occurred in the light of recent research. For example, the work of McConkey

(1981) altered the ways in which manipulative skills were taught. As a result of this research much greater emphasis was placed on allowing the child to spend an equal amount of time exploring the structured materials in which ever way he/she chose.

THE SEMI-STRUCTURED SECTION OF THE INTERVENTION PROGRAMME

The Parent-to-Parent Mutual Support System

This system was set in motion at the birth of a D.S. infant. After consultation with the Paediatrician and the new parents, arrangements were made for another mother and D.S. baby who were already part of the intervention programme to visit the hospital. For new parents the knowing of other persons undergoing the same stress provided a valuable opportunity to test reality and to reconcile a diagnosis and its stereotypes with the real child. It was assumed that parents coping with the shock of the birth of a handicapped child would be unable to consider or remember all the information given to them on any one official visit. Thus the possibility of talking to another mother provided an opportunity for absorbing factual information on D.S. and another view of what it might mean in terms of family life. This early contact also provided new parents with someone to relate to when they first attended the intervention clinic. It was commonly said by mothers that their first visit to the clinic was a stressful experience made much easier by virtue of having already met at least one member of the staff and one

other parent and child. Once families began to attend the intervention clinic regularly they formed their own friendships and support systems within the group. Friendships tended to develop between people whose children were closest in age, although other factors such as where they lived or whom else they knew in common might influence these arrangements. The informal nature of the baby clinic and the serving of morning tea at a mid-point in the sessioned allowed maximum opportunity for inter-change between parents. Morning tea was made on a roster by the local Plunket Committee. This served the dual purpose of releasing the staff from such a practical task as well as providing an opportunity for the young mothers on the Plunket Committee to observe and communicate with mothers of a handicapped child, an opportunity which it was hoped would be beneficial to them as members of the wider community.

During the clinic time the staff intervened occasionally to talk to groups of people together, or to set up opportunities for people to share or help one another with problems. Families used this time not only to experience mutual support but also to share ideas of a practical nature. This was considered extremely advantageous in that it widened the pool of mutual knowledge and understanding and encouraged everyone in the belief that there was no single right way in which to achieve developmental goals. Mothers would help one another in a variety of ways. For example, ideas on breastfeeding, transport, books, equipment they had found useful, and extra visiting of new mothers experiencing great stress or difficulties in bonding.

As normal babies were frequently present during the clinic time, opportunities were naturally provided for the handling of normal infants as well as handling of one another's D.S. infants. This natural mix of handicapped and normal, of siblings and of other adults, allowed those facing the reality of a D.S. child to experience acceptance and self-worth within a supportive and nonthreatening environment.

Transport

It was the researcher's belief that it should be made as easy as possible for parents to attend the intervention clinic. During the early weeks following the child's birth families would often be at their most disadvantaged in terms of physical and emotional disorganisation. If transport to a clinic presented difficulties they might feel they had a valid reason not to attend and to continue in the "denial" phase for some considerable time. Awareness of the possible operation of these negative factors allowed them to be dealt with in the following ways.

(i) If at all possible transport was arranged amongst members who attended the clinic, or was provided by a member of the child's extended family, for example, grandmother.

(ii) A roster system of voluntary drivers was available to transport those having

difficulties in attending the clinic. These drivers were drawn from local church, plunket and community groups. As with all involvement of a community nature, the benefits were felt by those giving as well as those receiving. Those living in outlying areas without transport were encouraged to travel by bus to town where they could be collected and transported by a voluntary driver.

The staff role included providing maximum support in the early stages so that few transport difficulties would be experienced by the families, whilst allowing them time to make their own arrangements and move towards taking responsibility for their own means of travel as the weeks progressed.

Home Visiting:

Although the major form of professional-parent contact was the weekly intervention clinic, home visits by staff did occur as part of a continuing involvement with the child's wider environment. In the days following discharge from hospital a member of the staff would arrange to visit the family at a time when both parents and/or members of their extended family could be present. This provided a further opportunity for supportive listening while families continued to express fears and anxieties about the reality of their D.S. child. It was also an opportunity for dissemination and clarification of information on D.S. and chromosome

abnormalities in general. Whilst in the home the staff member would discuss with the parents ways in which they might arrange their household routines in order that the handicapped baby might receive maximum opportunity to learn and to bond with his/her family. For example :- moving the baby's bed from the bedroom into the living room where he/she could observe general family activity; leaving the bassinet free of drapes and covers so that the prone child might visually scan the environment. Discussions would centre around such topics as how to make all the child's waking moments learning experiences without the necessity for parent-child interaction all of the time; or about bedding and clothing arrangements. These informal meetings provided a valuable opportunity for parent and professional to learn and guide one another (within the physical evironment which would be the child's primary focus) in actions and principles which would best suit the individual family needs.

Home visits by a member of the intervention team occurred on other occasions during the child's involvement with the intervention clinic. These were of two types. First, regular visits once a term to make observation measures of the child's ability to function in his home setting, as well as to talk over worries or problems which might have been affecting the child specifically, or the wider family network. Secondly, incidental home visits were made by the physiotherapist or the speech-therapist if a particular need arose, e.g. extended illness or a necessity for implementing and assessing a particular programme within the child's home.

In summary the general aim of all home visiting was to provide opportunities for the professional staff to particularise the philosophy and structured content of the programme within and around the real life context of the individual child and his/her family.

Availability of Additional Services

Arrangements were made for visits to the intervention clinic by other related professionals who could provide further specialist information of interest to families with a handicapped child.

A cytogeneticist visited the clinic twice a year to discuss with individual families the whole area of chromosome abnormality and of genetic karyotype. This was not the genetic counselling service referred to earlier. These group sessions were normally for those with infants younger than six months of age and were open for all family members to attend. Individual cases and problems were informally and freely discussed. As part of this session a B.B.C. documentary video-tape (vid. Chapter III, p. 134) was shown and considered; it clearly describes the genetics of D.S. as well as the procedures for determining abnormality pre-natally.

Occasional visits from a music therapist enabled parents and staff to benefit, both theoretically and practically, from specialist knowledge and technique.

The Toy Library Service:

Families were referred to the toy library following the birth of their handicapped child. Although the intervention clinic possessed a good range of infant toys and equipment the need for extra or specific items could very satisfactorily be met by the toy library facility. This service provided the parents with an opportunity for becoming increasingly involved in the educational needs of their child without the necessity for monetary expenditure. It is described as a voluntary community service for lending toys to children with special needs.

Children's Groups:

During the child's second year (12 - 18 months) parents were encouraged to participate with their child in a community playgroup situation. Many such groups existed throughout the city and suburbs. They were usually for children under pre-school age, were informal in structure and were organised by Plunket, Church, neighbours or Playcentre, etc. Such groups provided continuing contact for the child and caregiver within the normal population, as part of prescribed community activity.

GENERAL CONTEXT OF THE STUDY AND ITS RELATIONSHIP TO THE PROGRAMME

The following factors operated within the wider family context and directly or indirectly influenced the functioning of the microsystem.

(1) It was often possible to teach and guide the staff of maternity hospitals in ways in which they might best help a mother and new born D.S. infant. Although no structure existed for this, the comings and goings of the intervention staff to the hospital following delivery of a D.S. child provided valuable opportunity for discussion and dissemination of information by reviewing individual needs and providing relevant literature for interested staff to read.

(2) The benefits of a good parent relationship with the General Practitioner would have wide-ranging effects, not only on the child's physical health but also on how the parents viewed themselves as coping, adequate parents. As D.S. children are likely to require more constant medical attention than normal children, parents should feel confident and happy with this continuing relationship.

(3) By providing for the indirect involvement of the extended family in the intervention programme of the handicapped child, (for example, visits to intervention clinics to observe activities and meet with staff and other parents) opportunities occurred for cementing family relationships and maximising personal involvement, which it was hoped would lead to greater acceptance of the needs and personal dignity of the D.S. population.

It would also seem that similar benefits accrued from the involvement families had with their own existing community structure such as schools, kindergartens, churches, cultural and sporting clubs. It was hoped that in these areas those in the wider context, which impinged upon the microsystem in a variety of ways, would gain understanding that would ultimately benefit families with handicapped children both practically and through changes which could then occur within the value system of society as a whole.

Summary of the Running of the Programme

The Early Intervention Programme for D.S. infants has been described with regard to aims, structure, personnel and content. The developmental approach to learning has been outlined encompassing physical, cognitive, language and social behaviours. The counselling component has been described as it relates primarily to the parents and families of the D.S. child.

The importance of community facilities and medical or paramedical services have been discussed in relation to the semistructured and unstructured aspects of the Early Intervention Programme.

Anecdotal Observations:

Although no individual records were kept of home observations, these did take place at varying intervals throughout the two year intervention period; as previously mentioned they were of two types, either "running record" or "time-sampling", and always occurred in the child's home environment. They were found to be particularly useful to the staff when assessing the relevance of individual programmes. For example, the intervention clinic itself provided only limited opportunities for the observation of motor, cognitive or language skills in the child. Also limited were observations of mother-child interaction and parents' ability to carry out the programme requirements.

All children were observed every six months as part of a routine home visit. The focus of the observations involved the following areas of infant competence: amount and quality of verbal behaviour; level of responsivity to mother and other members of the family; level of competence with own toys; physical skills in home environment.

The observational data were discussed between members of the interdisciplinary team in an attempt to increase the professionals' knowledge of aspects of the child's functioning in the home environment, in order to meet the needs of individual children and their families. For example, the physiotherapist might observe that access to and from the house via steps involved a particular difficulty for the D.S. child. After completing an observation of the child's ability to crawl or walk to and from the house she would provide a programme of physical exercise adapted for the child's situation. It was assumed that parents were unlikely to be able to do this without skilled help.

CHAPTER V

DESIGN, SAMPLE AND MEASURES

DESIGN

This study was not an experiment. As the previous discussion (Chapter III) has indicated, it was an attempt to provide an effective intervention using available resources, and having concern for the requirements of ecological validity.

However, any assessment of the effectiveness of the programme requires the establishment of some standards of comparison which can be used to interpret and evaluate the progress of the children within the intervention programme. Without such standards of comparison any claims which might be made for the effectiveness of the programmes can have no real substance.

Two standards of comparison were used. These were as follows:

(a) All the information which was available on the development of D.S. children and of normal children were used to evaluate the progress of D.S. children within the intervention programme.

(b) The progress made by a comparison sample of D.S. children drawn from another city (Dunedin). This contrast group, drawn from the births occurring in a similar city, provided a reasonable basis for making useful comparisons although Dunedin, is a smaller city, there was no reason to believe that the nature and type of D.S. children born in that city should be any different from those born in Christchurch, nor that the home environments in which they were raised should vary in any systematic way.

The intervention group of infants was closely monitored from birth to two and a half years, whilst the comparison group were assessed at the completion of the study (approximately two and a half years).

SAMPLE

(1) The Intervention Group

As has been mentioned in the previous chapter the sample was gathered over a two year period, most of the children being referred directly by a paediatrician at birth. As it was not possible to ascertain from paediatricians how many D.S. births had occurred in Christchurch during the years prior to the study, and therefore at what annual rate they might be expected to occur, it was decided that the study would eventually comprise a minimum sample of ten home-reared infants, referred to the programme from the earliest possible age. In fact, during the period February 1977 to December

1979 14 D.S. children were born in and around Christchurch and all were referred to the intervention programme. Three of the children were from sets of twins in which the other twin was a "normal" child. Two sets were male and female and one set comprised two male infants. Of the original fourteen children, three died from heart failure (due to congenital cardiac abnormality) during the first 18 months of life. Two of these children were from sets of twins. The final intervention sample included eleven infants. As formal assessment procedures were not scheduled prior to the deaths of the above-mentioned three children, they were excluded from all tabled results. These children are identified alphabetically as D, H and N in Table 5:I.

As can be seen from Table 5:I, the mother's age at the birth of the D.S. subject ranged between 18 years and 47 years with the majority of children born to mothers in the under 35 age group. As demographic information of maternal age in relation to D.S. is not available in New Zealand, it is not possible to draw any conclusions for New Zealand as a whole from the maternal ages represented in this sample. However, it is possible to look first at what is known from general population statistics, secondly at information relating specifically to the New Zealand population, and then to compare these with the age data from the Christchurch and Otago populations of D.S. births in this study. General population statistics (1.) give the following guidelines:

(i) one D.S. birth occurs in every 600-800 births

(1.) Vital Statistics: New Zealand Department of Statistics 1977, 1978, 1979, Govt. Printer, Wellington

TABLE 5 : I

THE INTERVENTION SAMPLE

Date of Birth	Sample	Sex	Maternal Age at Birth of Infant	Place in Family	Chromosome Analysis	Age of Referral for Intervention	Known Physical Abnormalities
26.2.77	A	B	24	3rd. Sibs. Girl. Boy.	Trisomy 21	8 weeks	Heart murmur
13.4.77	B	G	32	2nd. Sibs. identical twin boys	Translocation 21/21	1 day	------
15.4.77	C	G	28	3rd. Sibs. Boy. Boy.	Trisomy 21	2 days	------
19.5.77*	D	B	24	1st. Sib. Twin Sister	Trisomy 21	1 day	Heart murmur Prematurity
31.8.77	E	B	30	4th. Sibs. Girl. Girl. Boy.	Trisomy 21	1 day	------
10.6.77	F	G	18	2nd. Sib. Boy.	Trisomy 21	1 day	------
17.7.77	G	G	24	3rd. Sibs. Girl. Boy.	Trisomy 21	7 days	Heart murmur
6.9.77*	H	B	32	1st. Sib. Twin Sister	Trisomy 21	3 months	Heart murmur Prematurity Nystagmous

TABLE 5 : I (continued)

THE INTERVENTION SAMPLE

Date of Birth	Sample	Sex	Maternal Age at Birth of Infant	Place in Family	Chromosome Analysis	Age of Referral for Intervention	Known Physical Abnormalities
24.2.78	I	B	28	1st. Sib. Twin Brother	Trisomy 21	6 weeks	Prematurity
7.5.78	J	B	27	2nd. Sib. Boy.	Trisomy 21	1 day	Apnea
21.10.78	K	G	42	14th.	Trisomy 21	3 weeks	Exomphalous (squint)
7.9.78	L	G	36	2nd. Sib. Boy.	Trisomy 21	1 day	------
28.9.78	M	B	47	1st.	Trisomy 21	7 days	------
23.8.78*	N	B	30	2nd. Sib. Girl.	Trisomy 21	1 day	Heart Murmur Nystagmous

* died before intervention was complete

(ii) 50% of all D.S. infants will be born to women under 30 years of age. The remaining 50% will be born to women over 30 years of age

(iii) As increased incidence occurs with increasing maternal age, a greater cluster could be expected in the 38-45 year age group

(iv) Because of efficient contraceptive measures and the use of sterilisation to limit fertility fewer women over 35 are now having babies than was the case previously. The effect of this may appear to weight the number of D.S. births in the under 35 year age group

(v) The average age for New Zealand women to give birth is 26.3 years (N.Z. Department of Statistics 1981). (2.) Therefore one could expect a cluster of births in the younger age group around that figure

(vi) The incidence of twins expected in the normal population is 1 in 100 live births. (3.) The sample in this study can be seen to vary from what could be generally expected in terms of predicted multiple births

Mothers' mean ages in the present study were 28.92 years for the intervention group and 30.2 years for the contrast group (vid. Tables 5:I and 5:2). These mean ages are slightly in advance of what New Zealand statistics show as the average age to give birth (26.3 years).

(2.) New Zealand Department of Statistics Demographic Bulletin, Vol. 4 No. 1, 1981.
(3.) vid. Note I, vol. 1979

TABLE 5 : 2

THE CONTRAST GROUP

Date of Birth	Sample	Sex	Maternal Age at Birth of Infant	Place in Family	Chromosome Analysis	Known Physical Abnormalities
21.12.77	1	G	23	1st	Trisomy 21	------
4.6.78	2	B	35	2nd	Trisomy 21	Not known Moved to North Island
9.8.78	3	G	24	3rd	Trisomy 21	------
4.1.79*	4	B	33	3rd	Trisomy 21	Died, 3 weeks. Heart defect. Hirschspring's disease
1.1.79*	5	B	38	2nd	Trisomy 21	Died, 5 months of congestive heart failure
18.12.78	6	G	42	4th	Trisomy 21	Heart defect
21.11.78	7	B	25	2nd	Trisomy 21	------
3.3.77	8	B	35	1st	Trisomy 21	Not known Moved from New Zealand

TABLE 5 : 2 (continued)

THE CONTRAST GROUP

Date of Birth	Sample	Sex	Maternal Age at Birth of Infant	Place in Family	Chromosome Analysis	Known Physical Abnormalities
29.7.79*	9	G	21	2nd	Trisomy 21	Died, 9 months. Heart defect
20.7.79	10	B	26	3rd	Trisomy 21	Died, 9 months.

* died before intervention was complete

For the intervention group seven out of fourteen mothers were aged 30 or above at the birth of their D.S. child, and in the contrast group five out of ten mothers were aged 30 or above. These results support what is known from the general population statistics mentioned previously.

The intervention group sample showed three out of fourteen mothers aged 35 or over at the birth of their D.S. child. The contrast group showed four mothers in this age range. As has been mentioned earlier it is known that fewer women are having children after 35 years. Therefore the factor of increasing incidence with older mothers is less likely to occur in the present population. This deduction is supported by the present study.

Of the fourteen infants in the original sample twelve were reared by their natural parents, whilst two were given up soon after birth to be placed in foster care. One of these children spent approximately five months in Karitane Hospital before alternative foster care was found.

Socioeconomic status as rated by Elley and Irving (1976) and Irving & Elley (1977) placed father's and mother's occupations between 1 and 5 for the intervention sample.

(2) The Contrast Group

For an appropriate source of children to form a contrast group the co-operation of paediatricians at Dunedin's Queen Mary Hospital was sought and willingly given. As Dunedin is somewhat smaller in population than Christchurch, a smaller number of births was expected in the two year period. At each birth, information was collected on the contrast children by paediatricians and forwarded to the author with the parents' permission. No contact was made with these families until the children were approximately 16 months of age when parents were asked through their paediatrician to co-operate in a study looking at the development of young D.S. children in the Otago-Southland area. All families gave permission and were subsequently visited in their homes where testing procedures were administered by an independent tester from the staff of the University of Otago.

As can be seen from Table 5:2, maternal age at birth of the D.S. child in this group ranged between 21 and 36 years; all the children were of standard trisomy karyotype and were all home-reared. Unfortunately only four of the original ten infants were eventually available for assessment. Two children moved away from the area, and four others died before 16 months of age. Those children excluded from the final contrast sample are referred to as: 2, 4, 5, 8, 9, 10 in Table 5:II. Parents' occupations ranged between 3 and 5 for both husband and wife on the Elley and Irving scales.

No formal intervention procedures existed in Dunedin for very young D.S. children but complete absence of other forms of help, professional or non-professional, cannot be assumed.

MONITORING OF THE CHILD'S DEVELOPMENT

The measurements used were intended to describe the individual child as he or she was functioning within the relevant ecological perspective. The type of early intervention employed in this study did not postulate a pre-determined ideal against which assessment could be made to determine the success or otherwise of the procedures the children were exposed to for the two-year duration of the research programme. Rather, the measurement must be seen as a way of describing "competence" at particular points in time using both objective and contextual assessment to give as broad a picture as possible of the developing child's adaptation to his/her world.

The measures used in this study were an attempt to meet the requirements of ecological validity as specified by Bronfenbrenner (1976). He argued that in order to be ecologically valid, research must fulfil three conditions. First, it must maintain the integrity of the real-life situations it is designed to investigate. Secondly, it must be faithful to the larger social and cultural contexts from which the subjects come. Thirdly, the analysis must be consistent with the participants' definition of the situation,

by which he means that the experimental manipulations and outcomes must be shown to be "perceived by the participants in a manner consistent with the conceptual definitions explicit and implicit in the research design." (1.) The study included two types of measures

(i) Comparison measures

(ii) Clinical (2.) measures for intervention group only

These two types of measures provided alternative sets of data about the same behavioural constructs (that is the levels of functioning of the D.S. infant and his/her family). The measures used attempted to sample the contexts of natural everyday activities thereby avoiding the problems of traditional laboratory models of evaluation and the difficulty of generalising from such results. The author was concerned to treat both the behaviour and the environment as a single interdependent unit.

The involvement of the research workers and associated professionals in the intervention programme allowed them to function as a continuing part of the infants' lives and not as strangers within their environment. The role of the researcher could be viewed as that of a participant observer. This had the advantage of providing supportive contextual data to that of the objective tester.

(1.) Bronfenbrenner (1976), in Cole, Hood & McDermott, (1978 p. 36).
(2.) "Clinical" as used in this context conforms to the definition cited in "A Dictionary of Psychology", James Drever, Penguin, 1973.

In summary the types of measures used to assess the effects of the intervention programme for D.S. infants and their families were attempts to achieve a match between the questions asked, the methods used and the conceptual basis of the study.

Difficulties with comparison measures

Particular difficulty was experienced in finding an independent psychologist to administer comparison measures. Experience in the testing and observation of young babies proved to be a difficult criterion to fulfil amongst practising psychologists. The assessment procedures were begun by three different people who subsequently were unable to continue after varying lengths of time. It became necessary to employ a fourth tester to complete the intervention group measures, and to test all of the contrast group. The intended time for final testing was to have been at two years of age. However, owing to problems of locating some of the contrast group families, and delays with testers' assessments, measures were completed in all but one instance by 2.6 years. (Subject 1 was aged 35 months by completion of testing.)

CLINICAL ASSESSMENTS - INTERVENTION GROUP

Hearing

When considering variables which may interfere with learning, hearing and vision must be seen to be of paramount

importance. After consultation with the Special Education Department of the Christchurch Teachers' College it was decided that the audiologists would screen all children from approximately nine months of age. It appeared preferable, not to test children prior to that age as they were unlikely to have balance in a sitting position. Each child was given an individual appointment, and the following tests were administered jointly by two audiologists.

(i) Distraction

(ii) Impedance

Results of these procedures allowed the interdisciplinary team to make appropriate adjustments in therapy for a child's hearing loss. Refer to Appendix H for descriptions of Distraction and Impedance testing.

Vision

At approximately one year of age all children received a full visual assessment from an Ophthalmologist. This was carried out in two parts and included both objective testing of the eyes and subjective visual assessment based on the responses of the child to visual stimuli. The aim of this examination was to ascertain the existence of general visual problems which might have interfered with the learning process. If glasses were required arrangements were made for the children to be fitted immediately. (Refer to Appendix H for explanations of objective and subjective visual testing).

Neurodevelopmental examination

Although regular paediatric clinics were held for the D.S. child from birth, a more extensive Neurodevelopmental evaluation was made at one year of age by the paediatrician who was involved in looking at the children's development throughout the study (vid. Appendix I). The procedure used was a standardised physical examination combining objective findings, e.g. measurements, with subjective evaluations, e.g. neurological functions. The subjective evaluations, were carried out according to a standard structured format and included a description of gait, function of the cranial nerves and examination of the peripheral nerves for muscle tone and reflexes. This clinical evaluation was intended to identify areas of abnormality which would need to be taken into account when planning developmental objectives for particular children, for example, such problems as cardiac defects, loose ligaments, abnormal gait.

DEVELOPMENTAL EVALUATIONS

Checklists from the Washington Down's Syndrome Programme (Hayden & Dimitriev) (vid.Appendix A) were used to monitor the children's developmental status. A child was credited with a particular skill when it had been observed in either the home or the clinic, and when its existence had been confirmed by three members of the interdisciplinary team. The checklist was used as a broad guide for the sequencing and identification of developmental stages. The general skill areas which were represented were expanded for both teaching

and skill generalisation with individual children., e.g. when the check list specified the fine motor skill of "raking and obtaining small object on table" it would be ascertained by both the teacher and the parent that the child learned to obtain a wide variety of objects from a table. Such objects would differ in shape, texture, weight, and in their visual position with regard to the child, i.e. directly in front, some distance away, to the left and to the right. The Washington checklists had been employed successfully for some years in the Seattle programme; it therefore seemed appropriate to use them for New Zealand children, adapting the nomenclature to local usage. For example "creeping" and "crawling", the more immature action being called "creeping" and the more mature hands and feet mobility being called "crawling".

As can be seen from Appendix A the checklists were divided into the following categories.

GROSS MOTOR

0-6 months

(i) Prone and supine positions which include eight stages of development

(ii) Pulling to sit without head lag

(iii) Sitting position (two stages)

(iv) Turning (two stages)

(v) Standing (two stages)

6-12 months

(i) Prone position (three stages)

(ii) Protective extension - front

(iii) Rolling over stomach to back

(iv) Rolling over back to stomach

(v) Creeping

(vi) Sitting (six stages)

(vii) Crawling (six stages)

(viii) Standing (eight stages)

12-18 months

(i) Balance and locomotion skills (14 stages)

(ii) Strength skills

(iii) Ball skills (two stages)

FINE MOTOR

Eye-Hand Co-ordination

0-6 months	11 stages	primarily concerned with: fixating, following, grasping, reaching
6-12 months	6 stages	manipulation of objects, greater maturity of hand skills
12-18 months	12 stages	using hand skills for purposeful activities

COGNITIVE

0-6 months	1 skill area	beginnings of object permanence
6-12 months	3 skill areas	development of object permanence
12-18 months	2 skill areas	problem solving

LANGUAGE

Receptive

0-6 months	3 skills	response to sound and voice in general
6-12 months	3 skills	response to specific vocal requests
12-18 months	3 skills	performing actions to vocal requests

Expressive

0-6 months	5 skill areas	non-specific vocalisations
6-12 months	2 skill areas	non-specific babbling and imitation of speech sounds
12-18 months	6 skill areas	specific vocalisations and imitation of words

SOCIAL SELF-HELP

Social

0-6 months	3 skill areas	smiling and laughing
6-12 months	6 skill areas	playing social games, indicating social responses
12-18 months	2 skill areas	appropriate play sequences

Self-Help

6-12 months	1 skill	self-feeding with fingers
12-18 months	4 skill areas	eating and drinking using utensils and cup

COMPARISON MEASURES

The intervention group was assessed over two visits each lasting an hour and a half whilst the contrast group was assessed during one visit lasting 3 hours. This was necessary due to the distance from Dunedin of three out of the four subjects, which made more than one visit per child very uneconomic with regard to travelling time and expense. During the three hour assessment the tester was fully aware of the infant's needs for sleep and food and the measures were administered at times appropriate to both parent and child, the length of time spent in the home by the psychologist often amounting to considerably longer than 3 consecutive hours.

The following measures were given to both the Intervention and Contrast Groups:

THE H.O.M.E. SCALE

The H.O.M.E., Observation for Measurement of the Environment (Caldwell & Bradley) is intended primarily as a screening instrument. Items in the inventory were constructed to represent such aspects of the early environment as frequency and stability of adult contact, amount of developmental and vocal stimulation, need gratification, emotional climate, avoidance of restriction on motor and exploratory behaviour, types of play materials available and home characteristics indicative of parental concern with achievement.

The dimensions of the H.O.M.E. Scale are as follows:

(i) Stimulation through toys, games and reading materials

(ii) Language stimulation

(iii) Physical environment : safe, clean and conducive to development

(iv) Pride, affection and warmth

(v) Modelling and encouragement of social maturity

(vi) Variety of stimulation

(vii) Physical punishment

The scale combined interview with observation and was administered by a person who went into the home at a time of day when the child was awake and could be observed in his/her normal routine for that day. The total procedure took approximately one hour to complete. Examples of what was observed during the interview included amount of mother-vocalising towards child during visit; mother's ability to name persons or objects for child during visit; amount of mother's touching and caressing child during visit.

It was decided to use this instrument as a measure of environmental factors which might have inhibited or enhanced the therapeutic intervention programme procedures which took place at the weekly clinics. Recent research and theory in child development has emphasised that the child affects the environment just as the environment affects cognitive status (Sameroff, 1975). It was hoped that this scale would provide an indication as to which families were providing a satisfactory home environment for their handicapped child.

The H.O.M.E. scale was designed for use with families of Infants and Toddlers. The current version of 45 items was extracted from a longer (72 item) version described by Caldwell, Heider & Kaplan (1966).

Reliability

Internal consistency estimates for the total scale, and each sub-scale were made by the authors. Kuder-Richardson 20 formula was used and they quoted coefficients ranging from .44 (subscale VI) to .89 (subscale III).

The stability of the measure was assessed from data collected from 91 families in Little Rock, Arkansas, when the children were six months, twelve months and twenty-four months of age. The mean total scores at 12 months of age is given at 30.85 with an S.D. of 7.59. The coefficients indicated a low to high degree of stability for all sub-scales, ranging from $r = .27$ (subscale III) to $r = .77$ (subscale VI).

Interclass coefficients were also computed to measure the similiarity of paired scores in relation to the variability of all scores. These were slightly lower than the product-moment coefficients and ranged between .25 and .76.

Validation Studies

The majority of validity studies of the H.O.M.E. have involved an examination of the relation between the home environment and measures of cognitive development. H.O.M.E.

scores appear to be significantly related to measures of cognitive development taken in early childhood (Bradley & Caldwell, 1976, 1977, 1979, 1980 and 1981).

Low to moderate correlations were observed between H.O.M.E. subscale scores and S.E.S. measures such as maternal education, paternal education, paternal presence and amount of crowding in the home. Correlations between the H.O.M.E. total score and S.E.S. indices tended to be somewhat higher in magnitude. The authors stated that the H.O.M.E. inventory appeared valid in terms of assessing aspects of the environment similar to those assessed with social status indices. Only in the case of maternal occupation did the majority of the correlations with the H.O.M.E. subscales fail to reach significance. Hollenbeck (1978) showed that the H.O.M.E. was significantly correlated with several indicators of S.E.S.

The studies were typically with low income families and mean scores on the 45 item scale are reported at around 31. Gray & Ruttle (1980) used a nine month home visiting programme compared with a control group, and reported mean H.O.M.E. scores of 31.9 and 28.7 for the two groups at pre-test, and 34.5 and 33.3 for two experimental group post-tests.

Noticeably higher mean scores were reported by Metzel (1980). She devised a programme for normal middle class families of first-borns and reported means of 37.5, 40.6 and 39.9 for three groups on post-test results.

McMillan (1981) reported an attempt to provide parent education to parents whose first child was entering the toddler period. The H.O.M.E. scale was used in pre and post-treatment assessment. No significant differences were found on the H.O.M.E. inventory for these conditions between the three groups. The mean scores were considerably higher than those reported by Caldwell. A mean score on the infants scale ranged between 38.40 to 39.25 pre-treatment and 39.59 to 40.40 post-treatment.

Several types of evidence pertaining to construct validity of the H.O.M.E are reported by the authors. Ramey, Mills, Campbell & O'Brien (1975) reported that the H.O.M.E. inventory successfully discriminated between "normal" homes and homes "at risk" for developmental retardation.

Procedures

The H.O.M.E. inventory was administered to all children in both the intervention and contrast groups. Mean ages at completion of the inventory were 16.72 months for intervention group and 2 years 4 months for contrast group.

A.B.C. SCALE (vid. Appendix D)

This rating checklist for Assessing the Behaviours of Caregivers (Honig & Lally) which has two versions (for caregivers of younger and older infants), was developed to measure specific caregiver behaviours with infants and children. Although the purposes in creating this instrument

related primarily to classroom and day care situations, it seemed a useful measure to use in this study in conjunction with the H.O.M.E. scale to obtain an indication of caregiver behaviours in the homes of D.S. infants. It was hoped that this measure would provide answers to such questions as what was actually going on in the child's home in terms of evidence of those caregiver behaviours deemed useful as indicators of a quality child rearing environment, e.g. language facilitation, presentation of Piagetian tasks and opportunities for sensorimotor development and the quality of social and emotional interactions with the infant. If the current trend towards "process" in mother-child interaction (Bradley & Caldwell, 1976) is accepted, the A.B.C. scale allows for quantitative assessment of the following eight caregiver-behaviour areas.

(i) Language facilitation
(ii) Social-emotional inputs (positive)
(iii) Social-emotional inputs (negative)
(iv) Presentiation of Piagetian tasks and opportunities for sensorimotor development
(v) Caregiving routines : with child
(vi) Caregiving routines : with environment
(vii) Physical development
(viii) Does nothing

Items for the A.B.C. behavioural categories reflect the programme goals of the Syracuse University Children's

Centre which has a programme for infants based on Eriksonian, Piagetian and language development principles, and as such reflects the conceptual bias of this study. The A.B.C. scale is administered by a trained observer who tallies the first clear example of any A.B.C. scale behaviour the caregiver emits during a two-minute rating period. This tally is repeated for three more two-minute periods. The observer then rests for two minutes, then rates again for four more two-minute periods. This ten-minute cycle of recording behaviours of the caregive is repeated three times in half an hour, allowing for a maximum of twelve tallies for any behavioural item. This results in a total observation time of 24 minutes.

Reliability

The authors quote 19 half-hours of analysed interobserver ratings. The percent agreement between observers was computed per category as:

$$\frac{\text{No. of agreed upon tallies}}{\text{Total possible tallies per category}} \times 100$$

Interobserver reliability was reported as 84%.

Validity

No validity studies are described in detail by the authors but mention is made of three separate studies which have found the A.B.C. to be a useful indicator of caregiver behaviour (Honig & Lally, 1975). Smith & Haggerty (1979) reported evidence of the usefulness of the scale for looking at caregiver behaviour in a Dunedin child-care centre.

ORDINAL SCALES OF PSYCHOLOGICAL DEVELOPMENT

In the introduction to their manual the authors (Uzgiris & Hunt, 1975) claim that the scales represent:

(1) "a novel approach to the assessment of psychological development in infancy. Inspiration for the measure came from Piaget's observations of the development of his own three children combined with other evidence of hierarchial organisations in the growth of intelligence and motivation."

(2) "the approach is novel in that the apparent order in the behavioural manifestations of the progressive levels of organisation of the central processes forms the framework for the assessment sequences. The instrument comprises ordinal scales pertaining to six branches of psychological development."

(3) "the ordinality of the scales permits new ways of assessing the levels of development in individual infants, new ways of comparing the levels of cognitive

> organisation achieved by different infants, and a way of determining the influence of various constellations of environmental circumstances on early development."

The authors stated that as the six scales differ qualitatively, and as the rate of development in these several branches may be relatively independent, the information from such a comparison could not fail to be substantially greater than that obtained from a mental age or I.Q. By the use of this instrument it is possible to compare the degree to which one infant is advanced or retarded with respect to others on each of the various scales.

In this study, the Uzgiris & Hunt scales were chosen to assess cognitive development at the end of the sensorimotor period. The theoretical and conceptual rationale behind the measures suited the present study. It was hoped that this instrument would substantially satisfy the requirements of ecological validity, although for reasons of economy it was possible to administer it to each child once only. As an untimed measure it allowed the D.S. child a greater measure of flexibility in ordering cognitive processes. Perhaps the most important reason for choosing these scales as a measure of cognitive development was for purposes of examining the hierarchically developing structures as espoused by the Piagetian model. The nature of the scales allowed for analysis of these structures in terms of degree of competence as well as flexibility of execution. The existence of

integrated, competent sequential sensorimotor behavioural structures as established by these scales is satisfactory evidence of cognitive growth in D.S. infants.

The Scales had to be administered, according to manual directions, at a time when the infant was fully co-operative. The test was administered in the child's home in the presence of the parent, and took approximately three-quarters to one hour to execute with a 2 1/2 year old D.S. child.

The six scales are as follows:

Scale I : The development of visual pursuit and the permanence of objects.

Scale II : The development of means for obtaining desired environmental events.

Scale III : The development of imitation: vocal and gestural.

Scale IV : The development of operational causality.

Scale V : The construction of object relations in space.

Scale VI : The development of schemas for relating to objects.

Reliability

The authors quote two revisions of the scale using a sample of 42 children of both sexes aged 1 - 23 months in the first phase, 23 children in the second phase, and 84 children in the third phase. Inter-observer agreement was high. The mean of the averages of percentages of inter-observer agreement for all 157 infant actions in the scales was 96.1. Inter-session or test-retest reliability showed substantial consistency and stability in the actions elicited by given situations over a period of forty-eight hours. For all actions, the mean of the averaged percentages of inter-session consistency was 79.9.

Validity

Although no evidence of validity of the measure is quoted in the manual the following researchers indicated the usefulness of the measure in assessing sensorimotor cognition. Kahn (1976) examined the reliability and validity of Uzgiris & Hunt scales with severely and profoundly retarded children; and Wachs (1975) examined the relation of infants' performance on Piaget scales between twelve and twenty-four months and their Stanford-Binet performance at thirty-one months. Results indicated that each of the subscales of the Uzgiris-Hunt scale was significantly correlated with subsequent Binet scores (R= .92). Of the eight subscales, object permanence correlated the most strongly with Binet performance at 31 months.

Wachs & De Remer (1978) again using developmentally disabled infants and pre-school children, employed the Piaget-based scales to examine the relationship between performance on these and adaptive behaviour in the home. The results indicated a significant relationship between the cognitive parameters of object permanence and foresight with social and self-help adaptive behaviours.

Procedures

Substantial difficulty was encountered by the author of this study in the administration of these scales. It proved almost impossible to find an independent psychologist skilled in the administering of measures to very young children. Three different psychologists agreed to perform the task, two relinquishing the role in the early stages and the third half way through testing of the intervention group. At that point another tester from Dunedin was employed to complete the testing of the intervention group and to assess fully the contrast group on all measures. Although this could not be considered an ideal arrangemment, factors of time, economy and lack of suitably qualified personnel placed definite restrictions on what was possible. As the third person retested the children assessed by the earlier psychologists the intervention sample was in fact assessed by only two people.

As with all other measures, arrangements for testing were made in advance with the families concerned and were as far as possible in accordance with optimum times for infant co-operation.

The equipment selected for eliciting behaviours was used for both groups and corresponds exactly to the list specified in the manual.

Although the age for testing was originally to be two years, as has been mentioned previously, the delays which occurred because of changing testers resulted in the following ages for completion of testing: mean age intervention group (30.72 months), mean age contrast group (30 months). It was not possible to perform a reliability check between the two final testers. Although this would have been desirable, both were fully qualified in all aspects of testing and measurement.

In order to reduce the amount of information on each child available from the score sheets on each scale (vid. Appendix F) a numerical ranking system was devised for each of the six scales to allow condensing of information for presentation in the study. The following descriptive system was employed for scoring the scales:

Scale I

As the scales are generally hierarchical in nature (with the exception of Scale VI) it was decided for scoring purposes to omit the negative categories. For example, Scale I 3(a) "Loses Interest". 1(a) "Does not follow object". These categories cannot be seen as steps in a series. The remainder of the steps were rated according to increasing difficulty. That is

(a) = 1 point;

(c) = 2 points;

(d) = 3 points;

(e) = 4 points;

(f) = 5 points.

Theoretical justification for this approach is consistent with that of Uzgiris & Hunt (1975, p. 54).

The maximum step reached by the child was scored, and the scale was then summed to achieve a total.

In Scale I tasks 13 to 15 were omitted because all children were physically fatigued by that point in testing.

The possible total for Scale I = 33 points.

Scale II

The same scoring system was employed for Scale II, with the exception of question 9, of which all six categories received a positive score. For example, 1, 2, 3, 4, 5, 6 points were awarded according to increasing difficulty of task, e.g. a simple task A(1), appearance of hand watching behaviour, and a more difficult task A2(d), grasping an object when it is visually presented using open hand action in anticipation of grasp.

The possible total for Scale II = 44 points.

Scale III(a)

5(a) counts - 1 as it is a negative reaction as opposed to no reaction, which would have been omitted entirely. B, C, D, E count 2, 3, 4, 5 points respectively as these steps are clearly progressive.
Postive total = 24 points.

Scale III(b)

Scored as III(a) where each step counts 1 point more than previous step.
Possible total = 17 points.

Scale IV

Scored as previous scales. Negatives are omitted for example, question 4(a). Therefore 4(b) = 1 point; 4(c) = 2 points; 4(d) = 3 points; 4(e) = 4 points.
Possible total = 29 points.

Scale V

Non-responses were omitted. Scoring as in previous scales.
Possible total = 28 points.

Scale VI

It was not possible to describe this scale numerically as it is not hierarchical in structure and it has no desired goals of achievement. The scale attempts to

record the child's repertoire of sensorimotor schemas which were activitated by presentation of a large number of varied objects. In order to quantify the information gained by the testers, the number of actions demonstrated in each category was specified and presented diagrammatically.

P.A.A.T. INVENTORY

The Parent As A Teacher Inventory (Strom, 1978) is a Likert-type scale used to measure child rearing expectations in parents and parent-surrogates of pre-schoolers. The Parent As A Teacher Inventory reflects a concern for the education of parents as unique individuals, rather than as members of a homogeneous group. The P.A.A.T. studies each parent in his or her own context thus relieving parents of the need to compete with others or to compare their children (Strom & Greathouse, 1974).

According to Strom (1978, p. 28):

> "The P.A.A.T. is a composite attitude scale in which individual parents describe feelings about various aspects of the parent-child interactive system, their standards for assessing the importance of various aspects of child behaviour, and their value preferences concerning child behaviour. The rationale for using such an instrument in parent education programmes is that an individual's emotional and behavioural responses to their own parent-child

relationship are a combination of present parenting experience, value-laden expectations and beliefs regarding child behaviour."

A detailed exploration is provided for each of five sub-tests.

(1) Parental acceptance of creative functioning and desire to encourage or suppress its development.

(2) Parent child-rearing frustrations and loci of the frustration.

(3) Parent feelings about control and the extent to which parental control of child behaviour is deemed necessary.

(4) Parental understanding of play and its influence on child development.

(5) Parental perception of their ability to facilitate the teaching learning process for their child.

Ten items designed to assess each of the five variables make a composite of 50 items. Each item has four possible answers and parents are asked to circle one. A numerical value of 4, 3, 2 or 1 was assigned to each response. The most desired responses in terms of what is known from child development research are valued 4. Twenty-seven items had a strong "no" as the desired response. The remaining twenty-three were reversed. The total score is obtained by summing all items, although separate totals were available for subsets (vid. Appendix E). The first ten of the fifty items in the inventory are as follows:

1. I get-tired of all the questions my child asks.
2. My child should be able to make a noise during play.
3. It is all right for my child to disagree with me.
4. My child needs to play with me.
5. Much of my child's learning will take place before he enters school.
6. I like my child to make up stories.
7. It gets on my nerves when my child keeps asking me to watch him play.
8. I want my child to say more than I do when we talk.
9. Playing with my child makes me feel restless.
10. It is hard for me to tell when my child has learned something.

Reliability

The P.A.A.T. was used as the basis for two doctoral studies involving black and white mothers (1972) and for two cross-cultural peer teaching studies (1973, 1974). The authors state that the P.A.A.T. was further used in 1973 through the Research Department of the Tucson Public Schools. It was administered to 124 parents participating in a compensatory early childhood education project.

The authors quote a Tucson 1973 pre-test coefficient alpha of .76 for the total instrument and a post-test 1974 coefficient of .81.

Elmquist (1975) reported an overall reliability of .81 for thirty white families in Tempe, Arizona (quoted by Strom).

Validity

A validation by Johnson (1975) is mentioned by the author (Strom). The validity measure (comparison of expressed feelings with observed behaviours) indicated a 66% consonance between feelings and behaviour.

The P.A.A.T. has been used in two studies involving the families of atypical children (Strom, Rees, Slaughter & Wurster, 1981, and Davis 1981).

In the first study the child-rearing expectations of 101 Australian parents of intellectually handicapped children were assessed. The overall P.A.A.T. index for subjects scoring at either the upper or lower extremes proved to be valuable in identifying those parents who would be the most or least successful teachers in a home-based language programme. Internal reliability yielded an alpha coefficient of .85.

The second study attempted to investigate the needs of 229 parents of atypical pre-schoolers in southern New Jersey with respect to the subsets outlined by the P.A.A.T., in conjunction with further parent-information measures developed specifically for use in the study. The P.A.A.T. was found to be useful in indicating differences in parents' perceptions of

themselves as teachers of atypical children when compared with other studies using normal children. The study concluded that parents of atypical children did not perceive themselves as positively as parents of normal children.

Procedures

This measure was used at the end of the research study in an attempt to determine factors which might indicate positive child-rearing expectations in the intervention group of parents. Although not exactly tailored for this study, it was used in reflecting parental attitudes towards children who were involved in another type of compensatory education, albeit in a different population. The conceptual areas with which the instrument was concerned reflected the bias of the parental education content of the early intervention programme, and it was hoped that the profiles might prove positive in the sub-areas of Play-and-Teaching-Learning.

The questionnaires were posted to families with an accompanying letter assuring them of confidentiality and providing guidelines for answering honestly. For example:

> "There are no 'right' or 'wrong' answers to these questions, so please be quite frank. The questionnaire gives you a list of ideas other parents have contributed and you simply indicate whether you agree or disagree".

One modification to the questionnaire was instigated by the author of this study with an accompanying explanation to the parent. It was felt necessary to change the word "speaks" when it specifically related to the child because of the non-verbal or limited verbal ability of D.S. children of 2 1/2 years of age. The alternatives given did not alter the sense of the question and were as follows: "demands", "communicates", "plays".

CHAPTER VI

RESULTS AND INTERPRETATION

CHARACTERISTICS OF BOTH SAMPLES:

As has been mentioned in the previous chapter, the intervention sample obtained over a two-year period included all live D.S. children within the larger metropolitan area of Christchurch, and comprised 14 infants three of whom died before the two-year intervention programme was completed. The final sample was eleven infants. The contrast group originally comprised ten infants born in Otago and Southland; four died within their first year of life, one moved overseas, and another to the North Island, before the two-year period had elapsed. The final sample consisted of four infants.

Sex of Infants

As can be seen from Table 6:1 the intervention sample originally comprised eight boys and six girls, with the final numbers being five boys and six girls. The contrast group originally comprised six boys and four girls, the final numbers being one boy and three girls.

TABLE 6 : 1

CHARACTERISTICS OF THE SAMPLE

Subject	Sex	Place in Family	Size of Family	SES Father	SES Mother	Reared by Foster Parents	Home Reared	Maternal Age	One of Twins
INTERVENTION SAMPLE									
A	B	3rd	3	5	5		Y	24	
B	G	3rd	3*	1	1		Y	32	
C	G	3rd	3	3	4		Y	28	
D[2]	B	1st	2	4	3	Y		24	Y
E	B	4th	4	3	2		Y	30	
F	G	2nd	2	5	5		Y	18	
G	G	3rd	3		2	Y		24	
H[2]	B	1st	2	3	3		Y	32	Y
I	B	1st*	2	4	5		Y	28	Y
J	B	2nd	2	4	4		Y	27	
K	G	14th	14	5	4		Y	42	
L	G	2nd	2	3	3		Y	36	
M	B	1st	1[1]	5	5		Y	47	
N[2]	B	2nd	2	1	3		Y	30	

TABLE 6 : 1 (continued)

CHARACTERISTICS OF THE SAMPLE

Subject	Sex	Place in Family	Size of Family	SES Father	SES Mother	Reared by Foster Parents	Home Reared	Maternal Age	One of Twins
CONTRAST GROUP									
1.	G	1st	1	3	3		Y	23	
2									
3	G	3rd	3	5	5		Y	24	
4(2)	B	3rd	3	N/K	N/K		Y	33	
5(2)	B	2nd	2	N/K	N/K		Y	38	
6	G	4th	4	3	3		Y	42	
7	B	2nd	2	3	3		Y	25	
8(2)									
9(2)									
10(2)									

* includes twins

(1) = first child of father i.e. new family situation

(2) = died before two years

Y = Yes

N/K = Not Known

Family Size

Within the intervention sample family size ranged between one and four, with the exception of one family of 14. The contrast group also ranged between one and four children (vid. Table 6:1).

Maternal Age

Maternal age at the birth of the D.S. infant ranged from 18 to 47 years (median age 29) and in the contrast group between 21 and 42 years (median age 24.5) (Table 6:1).

Rearing of Infants

No children in either intervention or contrast groups were institutionally cared for, although two children from the original intervention sample were not cared for by their parents from birth and were subsequently reared by foster parents who participated in the intervention programme. Child D was taken into foster care at three weeks of age. Child G resided in Karitane Hospital for the first six months, after which she also was reared by a foster mother.

Socioeconomic Status (S.E.S.)

The socioeconomic status of the parents was assessed by using the Elley & Irving (1976) Revised Socio-economic Index for New Zealand (male : 6 levels) and the Irving & Elley (1977) Socioeconomic Index for the female labour force in New Zealand (6 levels).

The father's occupation in the intervention sample ranged between level 3 (clerical) and level 5 (semi-skilled) with the exception of one father (classed as professional). The contrast sample showed the same range with no father classified in the professional occupations. For women, the range for the intervention sample was again from level 2 to 5, with one exception and for the contrast sample the range was 3 to 5, with no women classified in the professional occupations.

Chromosome Analysis: (Karyotype)

As can be seen from Tables 5:1 and 5:2 all subjects except one were of the standard Trisomy 21 type. The translocation child in the intervention sample was a non-inherited balanced 21/21. It is interesting to note that this infant, a girl (B) is preceded in her family by identical twin boys, and was subsequently succeeded by identical twin girls, each of the mother's three pregnancies involving a genetic deviation from the norm.

No parent in either group reported any family history which would have indicated a familial tendancy towards chromosomal nondisjunction.

Physical Abnormalities:

As can be seen from the Tables 5:1 and 5:2 five of the original 14 children had some congenital heart defect identifiable soon after birth. In subjects D, H and N the

defect was classified as inoperable and sufficiently severe to cause periods of illness and hospitalisation, with ensuing death from heart failure during the child's second year.

Prematurity was an associated problem in three out of the 14 children, and in all cases the child was one of twins. Tables 5:1 and 5:2 show an expected clustering of abnormalities in the three subjects with severe heart defects, that is, extensive visual problems in H and N, and twinning and prematurity in D and H. Subjects A and G required no medical intervention for their heart murmurs, and no apparent difficulties in development were observed in those children.

Subject J suffered a number of marked Apnea attacks during the first post-natal week. The child appeared to have no associated difficulties in his early months, but subsequently developed hypersensitivity of the mouth, lips and tongue.

In the contrast group four of the ten children in the original sample were known to have severe heart defects, which factor was the eventual cause of death in three of these subjects. The cause of death was not known for subject 10. Subject 6 was subsequently operated on to repair her congenital heart abnormality (date not known).

Summary

It can be seen therefore that for both intervention and contrast groups, the most common difficulty affecting development and subsequent life-span of these groups of D.S. children was congenital heart abnormality. This finding is supported in the literature (vid. page 29).

SIGNIFICANT CHARACTERISTICS OF THE INTERVENTION SAMPLE

The following information on the intervention group was obtained as part of the intensive monitoring and assessment which took place as part of the intervention programme. No comparable assessments were obtained from the contrast group (vid. Table 6:2).

Hearing

Audiological assessments were made at nine months of age on all children. These were administered by two qualified audiologists at the Christchurch Teachers' College Audiology Clinic. All children within the intervention sample were found to have receptive hearing within the normal range and normal pathways for the reception of sound. However, it is not uncommon for D.S. children to have hearing loss due to the condition of Otitis Media, and this was found to be the case in three of the infants who were retested during their second year. These children all had a fluctuating hearing loss associated with a history of ear infections and fluid behind the ear drum. All were referred to an Ear, Nose and Throat surgeon for corrective surgical procedures.

TABLE 6 : 2

SIGNIFICANT CHARACTERISTICS OF INTERVENTION SAMPLE

Subject	Hearing	Vision	N.D.S.	Chromosome Analysis	Known Physical Abnormalities
A	L	L	N	Trisomy 21	Heart murmur
B	L	L	N	Translocation 21/21	
C	N	N	N	Trisomy 21	
D*	-	-	N	Trisomy 21	Congenital heart defect. Prematurity
E	N	N	N	Trisomy 21	
F	N	N	N	Trisomy 21	
G	N	N	N	Trisomy 21	Heart murmur
H*	-	L	N	Trisomy 21	Congenital heart defect. Prematurity
I	N	N	N	Trisomy 21	Prematurity
J	L	N	N	Trisomy 21	
K	N	L	N	Trisomy 21	
L	N	N	N	Trisomy 21	
M	N	N	N	Trisomy 21	
N*	N	L	N	Trisomy 21	Congenital heart defect.

* = died
N = Normal
L = Loss
N.D.S. = Neuro-developmental status
- = not tested

Vision

All children were seen by an ophthalmologist at one year of age to determine both visual acuity and functional qualities of the eye and optic nerve. Two infants were referred at an earlier age (six months) because of a suspected visual difficulty. Both infants H and N who subsequently died of heart failure had severe nystagmus with associated problems of focus and reduced vision necessitating the immediate fitting of glasses. Of the final sample of 11, three children had visual problems requiring glasses at one year of age, and in two cases out of the three, a bilateral squint which was surgically corrected at two years of age.

Neurodevelopmental Status:

All children were seen by a pediatrician at one year of age and assessed on the neurodevelopmental evaluation of Denhoff & Hyman (vid. Table 6:2). No children were found to have abnormal central nervous system functions (Appendix I).

Summary of the Identifying Characteristics of the Intervention Sample

Subject A (d.o.b. 26.2.77)

A boy born third in a family where the mother was a waitress and the father a storeman. Mother's age at the birth of the infant was 24 years, the siblings, a boy and a girl, were both pre-schoolers. The child was referred for

intervention at eight weeks. Physical difficulties included a heart murmur and some visual and auditory impairment. Chromosome analysis was trisomy 21.

Subject B (13.4.77)

A girl born second in a family following identical twin boys of four years. Mother was a secondary school teacher aged 32 years, father a dental surgeon. The child was referred for intervention the day following her birth. Physical difficulties included visual and hearing impairment. Chromosome analysis was 21/21 translocation.

Subject C (15.4.77)

A girl born third in a family following two boys. Mother was aged 28, and was a clerical worker, father a clerk. Referral for intervention occurred at two days. The child was a trisomy 21 with no major physical abnormalities.

Subject D (19.5.77)

This boy was one of non-identical twins born prematurely. His chromosome analysis was trisomy 21, his sister's was normal. The infants were the first born of a 24 year-old mother who was a clerical worker and a father who was a ship's purser. The mother did not take the infant from the hospital and he was subsequently reared by foster parents (from the age of 3 weeks) who involved him in the intervention programme. The child had a heart defect from which he subsequently died. Intervention ceased at nine months due to his deteriorating physical condition and his move to the North Island.

Subject E (31.8.77)

This was the fourth child in a family of two girls and a boy. He was a trisomy 21 with no physical abnormalities. Mother was aged 30 years and was a primary school teacher, father owned a butchery business. The child was referred for intervention at one day.

Subject F (10.6.77)

This girl was the second born (older child was a boy) of a mother aged 18 years who was a nurse-aid, and a father who was a freezing worker. The child was a trisomy 21 with no physical abnormalities. She was referred for intervention at one day.

Subject G (17.7.77)

This girl was born to a Maori mother aged 24 years and a European father who was in the army. The mother's occupation was not known. The family had two older children (boy and girl) one of whom was severely deaf. The child was a trisomy 21 with a heart murmur. Referral for intervention occurred at seven days and, although the parents initially took the child home from hospital, she was placed in Karitane Hospital at two weeks of age. As she was never claimed by her mother she went into foster care from the hospital at six months of age when intervention commenced. During the six months of the child's stay in Karitane Hospital the intervention team visited the hospital on a number of occasions to advise the staff on her development and to give guidance for stimulating her cognitive and physical growth.

Subject H (6.9.77)

This boy was one of non-identical twins who were the first born of a 32 year-old mother. Both the mother and the father were in the Police Force. The infants were born prematurely. The boy was a trisomy 21 and the girl normal. The infants were in neonatal care for some weeks and the diagnosis of D.S. and subsequent referral for intervention was not made until three months. The child had visual impairments, including an error of refraction and nystagmus, and a severe congenital heart defect from which he died at one year of age.

Subject I (24.2.78)

This boy was a non-identical twin. His chromosome analysis was trisomy 21, his brother's was normal. The infants were born prematurely to a 28 year-old mother who was a nurse aid and a father who was a carpenter. The infants were first born. The D.S. twin had no physical abnormalities. Referral for intervention occurred at three weeks of age.

Subject J (7.5.78)

This boy was the second born to a 27 year-old mother who was a clerical worker and a father who was a stevedore. The infant's chromosomes were standard trisomy 21 and he suffered anoxic attacks during the first post-natal week. The child was referred for intervention at one day. There were no physical abnormalities, although auditory impairment and oral hypersensitivity subsequently became severe problems.

Subject K (21.10.78)

This girl was the 14th child in a family where the oldest child was aged 21 years. The mother was 42 years of age and had been a shop assistant and the father was a storeman. The child was born with exomphalous which was surgically repaired during the first post-natal week. The infant was a trisomy 21 and was referred for intervention at three weeks of age. There was visual impairment.

Subject L (7.9.78)

This girl was the second child (older child a boy) of a 36 year-old mother who was a nurse and a father who was a clerical worker. She was a trisomy 21 who was referred for intervention at one day. The child had no physical abnormalities.

Subject M (28.9.78)

This boy was born to a 47 year-old mother who was a machinist, the father a freezing worker. Both parents had older children by previous marriages, although the father's children were adopted and did not include a son. This infant was the only child of the marriage. He was a trisomy 21 who was referred for intervention at seven days. There were no known physical abnormalities.

Subject N (23.8.78)

This boy was the second child of a 30 year-old mother who was a law clerk and a father who was an economist. The

infant was referred for intervention at one day and was a trisomy 21. His physical abnormalities included a severe heart condition from which he subsequently died at 18 months, and a marked visual impairment from an error of refraction and nystagmus.

DATA ON THE PROGRESS OF THE INTERVENTION SAMPLE: (vid. figure 6:I)

The data which follows is divided into three sections.

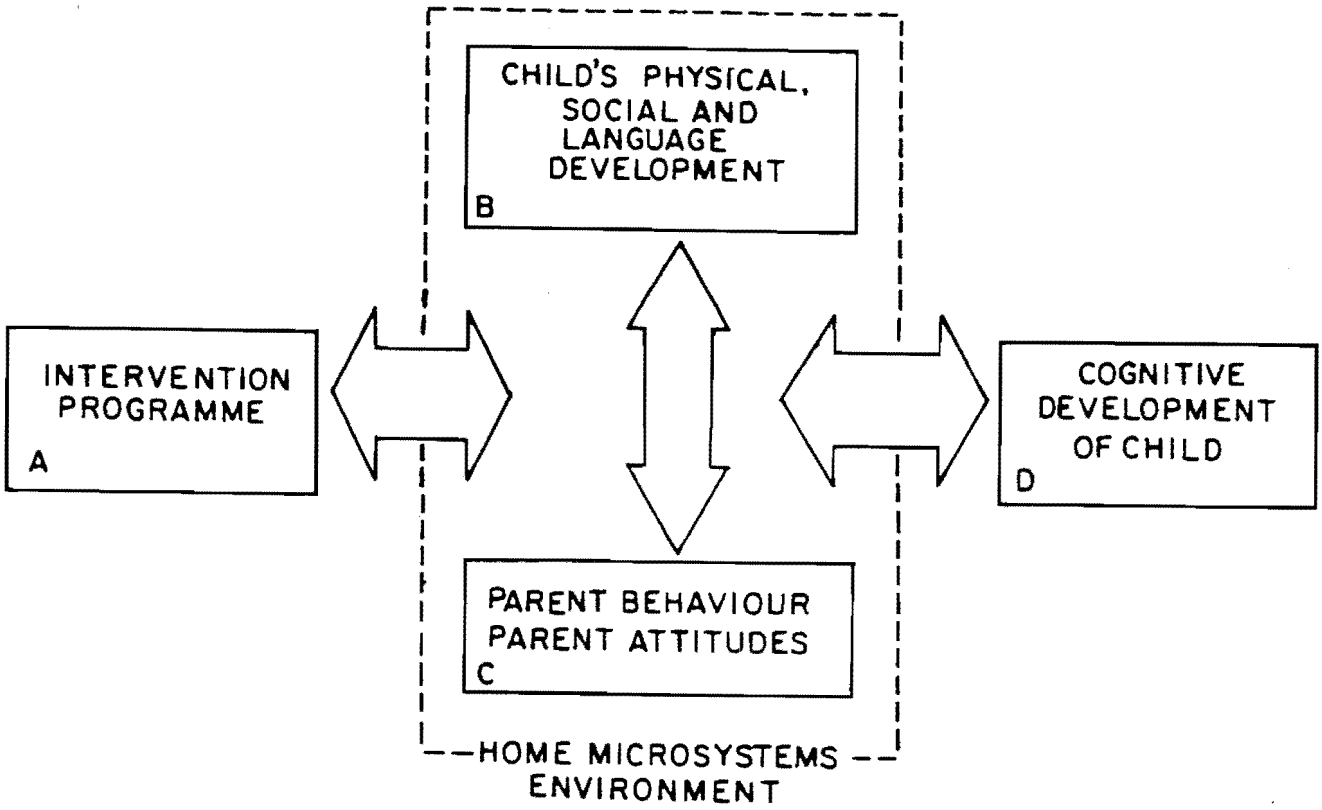
1. Monitoring of D.S. infant's development:

This data describes the effects of the intervention programme on physical, social, cognitive and language development. The intervention sample is compared with normal children and with D.S. children (Share & Veale). The assessment used was the developmental checklist. Comparisons with Sheridan norms of normal development was chosen because they are most commonly used in Paediatric assessments in this country. However, the comparisons which can be made with the developmental checklist used in this study were so minimal it was decided to include also the older (but still frequently used) Gessell norms to provide further comparative information.

2. Assessment of the home environment:

The effect of the intervention programme on the home microsystem was assessed, especially those aspects likely to affect the child's cognitive intellectual development. The

FIGURE 6:I



Diagrammatic representation of the cause and effect relationship between the intervention programme and the participants involved.

assessments used attempted to measure the type of home environment available to the child (H.O.M.E. scale), the quality of caregiver behaviour towards the infant (A.B.C. scale) and the mother's perceptions of herself as a teacher of a handicapped child (P.A.A.T. Inventory).

The above measures provide information on what parents have learnt as a result of their involvement in the intervention programme. Such factors as providing a stimulating home environment, using toys appropriately, talking in a stimulating and responsive way to their infants, providing learning experiences and understanding child development were emphasised in the programme (vid. Chapters III and IV).

3. Assessment of cognitive/language development:

These areas of development were assessed on tthe Uzgiris and Hunt Piagetian based scales. Scores on these scales represent an indication of the current behavioural level of infants functioning in Piagetian terms.

Figure 6:I is an attempt to depict the focus of each of these different areas of assessment.

(a) The intervention programme.

(b) The developmental checklists: comparison with available norms.

(c) The H.O.M.E., P.A.A.T. and A.B.C. Scales. Comparison with the contrast group.

(d) The Uzgiris and Hunt: comparison with the contrast group.

The feedback situation indicated in the figure required the intervention programme to be altered to fit the developing child. It is important to note that the effects of the programme will necessarily differ depending on their meaning to the participants in the system. In Bronfenbrenner's terms, this will occur even though the systems and subsystems may be similar in form.

PROGRESS OF THE INTERVENTION GROUP: DEVELOPMENTAL CHECKLIST

The Developmental Checklist was used for all children during the two year Intervention Programme to monitor individual developmental status. The checklists were filled in and the terminology discussed and understood by all members of the interdisciplinary team. A child was credited with a skill on the checklist when it had been observed either in the home or intervention clinic by more than one member of the professional team. An observed skill required confirmation by two other members of the professional team before credit was given.

It was not always possible to record the exact date a skill first appeared. Factors such as illness, family holidays, (or in the case of subject G extended period in Karitane Hospital) may have resulted in a delay before the skill could be recorded.

COMPARATIVE DEVELOPMENTAL DATA

Comparative Developmental Data for Skills (Table 6:3)

Table 6:3 describes the skills included in the checklist (average age in weeks) when a task was recorded as having been accomplished by the child. Included in the table are comparative age norms reported by Sheridan (1960) for normal development, and the Share & Veale (1974) age norms for the development of D.S. children in New Zealand. As can be seen from the table, the Developmental Checklist specifies a greater range of behavioural categories than do either the Share and Veale or the Mary Sheridan norms. Consequently comparisons can only be made with a limited number of behaviours.

(i) Share & Veale (Developmental Landmarks for Children with Down's Syndrome, 1974)

During 1965-7 a survey of Down's Syndrome children under six years of age was made throughout New Zealand. Subjects included both home-reared and institutionalised children. Data indicating the ages

TABLE 6 : 3

AGES RELATING TO ACQUISITION OF DEVELOPMENTAL SKILLS

Developmental Task	Medians	Age when skills were introduced	Intervention Subjects Mean (Weeks)	Intervention Subjects Range (Weeks)	Share & Veale Mean (Months)	Sheridan Mean (Months)	Approximate developmental task
I. GROSS MOTOR							
Lifts head prone		0-6	5.0	2-8			
Lifts head supine		0-6	8.27	4-16			
Stomach-chest up : arm support		0-6	13.0	6-20			
Sits - head steady	10	0-6	9.45	4-18	5.8	3	Holds head erect
Rolls over	18	6-12	21.26	12-30	8.5	6	Rolls over
Bears weight on feet		0-6	13.0	3-30			
Pulls to sit : no head lag		0-6	10.0	4-18			
Sits self supported		6-12	22.63	16-30			
Protective extension - sides		6-12	34.09	25-44			
Maintains self in crawling position		6-12	35.54	28-56			
Sits alone	32	6-12	30.72	24-40	12.7	8	Sits unsupported (1 month)
Gets into crawling position		6-12	48.0	28-76			
Reaches in crawling position		6-12	38.27	17-56			
Wheelbarrow		12-18	45.09	30-122			
Gets to sitting		6-12	48.65	35-62			

TABLE 6 : 3 (continued)

AGES RELATING TO ACQUISITION OF DEVELOPMENTAL SKILLS

Developmental Task	Medians	Age when skills were introduced	Intervention Subjects Mean (Weeks)	Intervention Subjects Range (Weeks)	Share & Veale Mean (Months)	Sheridan Mean (Months)	Approximate developmental task
2. FINE MOTOR - Adaptive							
Fixates on object		0-6	4.45	2-8			
Follows object 180° lying down		0-6	9.81	3-24			
Follows object 180° sitting up		0-6	11.45	4-25			
Brings hands together		0-6	15.0	8-24			
Grasps		0-6	12.54	4-24			
Regards small object on table		0-6	16.0	12-24			
Reaches lying down		0-6	15.54	6-28			
Reaches sitting up		0-6	22.0	18-29			
Looks for dropped object		0-6	29.45	17-40			
Rakes and obtains small object on table		0-6	29.0	19-40			
Holds two objects		0-6	26.0	11-40			
Transfers objects	28	6-12	28.0	15-40	11.4	6	Transfers objects in hands
Picks up two blocks		6-12	30.0	20-40			
Bangs together		6-12	36.0	20-40			
Points to pictures in books		6-12	46.0	26-62			

TABLE 6 : 3 (continued)

AGES RELATING TO ACQUISITION OF DEVELOPMENTAL SKILLS

Developmental Task	Median	Age when skills were introduced	Intervention Subjects		Share & Veale	Sheridan	Approximate developmental task
			Mean (Weeks)	Range (Weeks)	Mean (Months)	Mean (Months)	
Thumb - finger grasp		6-12	42.0	28-56			
Pincer grasp		12-18	42.09	34-56			
Takes objects out of container - drops		12-18	38.0	28-56			
Rings on a stick - take		12-18	49.0	32-72			
Rings on a stick - put		12-18	62.0	40-84			
Rings on a stick - release		12-18	65.0	42-80			
Peg in a can - take		12-18	47.0	32-72			
Peg in a can - put		12-18	54.0	34-80			
Peg in a can - release		12-18	60.50	30-80			
Peg in a hole (large) - take		12-18	51.0	32-80			
Peg in a hole (large) - put		12-18	70.0	34-100			
Peg in a hold (large) - release		12-18	68.0	40-100			
Circle in a circle 1:1 take		12-18	52.63	32-80			
Circle in a circle 1:1 put		12-18	64.72	42-80			
Circle in a circle 1:1 release		12-18	67.72	42-100			
Square in a Square 1:1 take		12-18	53.0	32-76			
Square in a Square 1:1 put		12-18	65.18	42-92			

TABLE 6 : 3 (continued)

AGES RELATING TO ACQUISITION OF DEVELOPMENTAL SKILLS

Developmental Task	Medians	Age when skills were introduced	Intervention Subjects Mean (Weeks)	Intervention Subjects Range (Weeks)	Share & Veale Mean (Months)	Sheridan Mean (Months)	Approximate developmental task
Balance reactions		6-12	44.73	30-80			
Straightens legs to stand		6-12	27.18	16-44			
Stands holding on		6-12	45.0	24-50			
Trunk rotations		6-12	51.18	30-06			
Pulls self to stand	56	6-12	58.27	26-82	18.6	11-12	Pulls self to stand
Crawls alone	56	6-12	56.90	30-92	17.7	10-11	Crawls and pivots
Cruises - left		12-18	66.09	40-100	20.6	11-12	Cruises at rail
Cruises - right	68	12-18	66.09	40-100			
Walks hand-held	72	12-18	74.90	64-116	22.1	11-12	Walks with support
Walks unaided	88	12-18	90.90	68-120	27	13-14	Walks unaided

TABLE 6 : 3 (continued)

AGES RELATING TO ACQUISITION OF DEVELOPMENTAL SKILLS

Developmental Task	Median	Age when skills were introduced	Intervention Subjects Mean (Weeks)	Intervention Subjects Range (Weeks)	Share & Veale Mean (Months)	Sheridan Mean (Months)	Approximate developmental task
Square in a Square 1:1 release		12-18	67.18	42-92			
Triangle in Triangle 1:1 take		12-18	54.72	32-80			
Triangle in Triangle 1:1 put		12-18	67.0	42-92			
Triangle in Triangle 1:1 release		12-18	67.81	42-96			
Holds crayon		12-18	50.09	32-68			
Scribbles		12-18	61.45	40-88			
Makes tower of 2 cubes		12-18	75.27	56-94			
Dumps raisin from bottle (modelled)		12-18	47.09	25-62			
Dumps raisin from bottle (spontaneously)		12-18	50.72	25-72			

TABLE 6 : 3 (continued)

AGES RELATING TO ACQUISITION OF DEVELOPMENTAL SKILLS

Developmental Task	Medians	Age when skills were introduced	Intervention Subjects Mean (Weeks)	Intervention Subjects Range (Weeks)	Share & Veale Mean (Months)	Sheridan Mean (Months)	Approximate developmental task
3. LANGUAGE - Receptive							
Turns to sound		0-6	5.0	2-15			
Turns to voice		0-6	8.5	2-15			
Responds to look		6-12	30.18	18-38			
Responds to take		6-12	55.36	36-72	29.4	12-18	Obeys simple commands
Responds to put		6-12	58.09	50-72			
Responds to give	60	6-12	54.72	21-72			
Points to one named body part		12-18	67.27	60-94			

TABLE 6 : 3 (continued)

AGES RELATING TO ACQUISITION OF DEVELOPMENTAL SKILLS

Developmental Task	Medians	Age when skills were introduced	Intervention Subjects Mean (Weeks)	Intervention Subjects Range (Weeks)	Share & Veale Mean (Months)	Sheridan Mean (Months)	Approximate developmental task
4. LANGUAGE - Expressive							
Makes some sounds		0-6	9.9	2-20			
Laughs	12	0-6	13.3	10-20	6.9	3	Laughs aloud
Dada or Mama (non specific)		6-12	33.0	24-50			
Imitates speech sounds							
- Dada		6-12	33.0	28-50	15.4	9	
- Mama		6-12	43.0	28-64			
- baba		6-12	35.9	28-31			
- ee		6-12	50.36	34-72			
- oo		6-12	53.27	32-76			
- ah		6-12	54.0	32-76			
Dada or Mama (specific)	64	12-18	65.50	52-96			Dada, Mama
Says three other words	72	12-18	71.8	48-88	39.5	18-24	Combines 2-3 words

TABLE 6 : 3 (continued)

AGES RELATING TO ACQUISITION OF DEVELOPMENTAL SKILLS

Developmental Task	Medians	Age when skills were introduced	Intervention Subjects Mean (Weeks)	Intervention Subjects Range (Weeks)	Share & Veale Mean (Months)	Sheridan Mean (Months)	Approximate developmental task
5. PERSONAL - Social							
Regards face		0-6	3.90	2-8			
Smiles responsively		0-6	7.09	4-15	3.6	4-6 weeks	Smiles
Smiles spontaneously	9	0-6	9.3	5-17			
Resists toy pull		0-6	17.5	12-25			
Works for toy out of reach		6-12	24.8	10-38			
Feeds self cracker		6-12	29.0	24-40			
Plays peek-a-boo		6-12	37.0	28-50			
Plays pat-a-cake		6-12	46.9	30-58			
Plays ball		6-12	50.2	32-68			
Drinks from a cup	52	6-12	50.3	34-60	30.1	12	Drinks from a cup
Imitates house work		12-18	64.4	52-80			
Uses spoon (feeds self)	55	12-18	55.1	28-96	33.2	24	Feeds self fully
Removes garment		12-18	47.5	30-72			

at which skills were completed were obtained retrospectively by parents or staff completing a questionnaire. These norms are not an observational record of the children's performance and it is possible that parents would have found it difficult to recall accurately the exact ages. However, as no other New Zealand norms were available, it was decided to present these for general comparative purposes. The 50th percentiles of normal development are also included in the Share & Veale study.

(ii) Sheridan (Children's Developmental Progress, 1960)

These norms were chosen for comparative purposes because they appeared to be the most recent ones and are commonly used by Paediatricians throughout New Zealand. They are also used for teaching purposes at the Otago Medical School.

The 1973 norms are the result of revisions which took place from the original publications. The items reflect four outstanding human biological achievements: upright locomotion, hand-eye co-ordination,use of spoken language and the evolution of complex social cultures.

The tests which were carried out were designed as a paediatric tool and were used in baby clinics,

nurseries, schools and hospital wards. It is largely an objective record of an individual child's performance in the four skill areas mentioned above.

Table 6:3 shows the ages at which developmental skills were introduced in the intervention programme. These ages were those used by the University of Washington Down's Syndrome programme and are based on the normal developmental progression.

Comparative Developmental Data for Milestones (Table 6:4)

It proved to be extremely difficult to locate any material which provided an up to date outline of the range of normal development. It is assumed that there is such a range but evidence of this is not apparent. Consequently the broad ranges for gross motor development indicated by Shirley (The First Two Years, 1933) and Illingworth (Basic Developmental Screening 0-2 years, 1973) are presented. Illingworth claims that "it is impossible to state the normal range of development, because it is always impossible to draw the line between the normal and abnormal : but the further away from the average a child is in any measurement, the less likely he is to be normal." (Illingworth, 1973, p. 27). The lack of information on the range of normality made it difficult to state the intervention sample's level of achievement as being within normal range. Wide variations are often accepted with skills such as walking which may be mastered as late as two years of age by so called "perfectly normal" children (50th percentile is 13-14 months).

TABLE 6 : 4

DEVELOPMENTAL MILESTONES

Median Developmental Ages (Intervention Sample)

SKILL	Intervention Sample (Weeks)	Share & Veale (Months)	Gesell & Amatruda (Months)	Range of Normality Shirley (Weeks)	Range of Normality Illingworth (mths/year)
Sits head steady	10	5	3	-	-
Rolls over	18	7	5	19 - 36	-
Sits alone	32	11	8	19 - 35	5 mths to 1 year
Pulls self to stand	56	17	10	31 - 54	
Crawls alone	56	17	10	30 - 49	-
Cruises	68	18	12	30 - 52	-
Walks hand-held	72	20	13	23 - 72	-
Walks unaided	88	24	15	49 - 75	8 mths to 4 years
Transfers object	28	10	7	-	-
Obeys simple commands	60	24	18	-	-
Laughs	12	6	5	7 - 16	-
Dada or Mama (specific)	64	12	10	-	10 mths to 5 years (speech)

TABLE 6 : 4 (continued)

DEVELOPMENTAL MILESTONES

Median Developmental Ages (Intervention Sample)

SKILL	Intervention Sample (Weeks)	Share & Veale (Months)	Gesell & Amatruda (Months)	Range of Normality: Shirley (Weeks)	Range of Normality: Illingworth (mths/year)
Combines words	72	36	21	-	-
Smiles	9	3	2	3.5 - 10	3 days to 7 weeks
Drinks from cup	52	28	21	-	-
Feeds self	55	33	24	-	-

Table 6:4 shows comparisons of the 50th percentiles for Down's Syndrome as quoted by Share & Veale, and the 50th percentile of normal development (Gesell & Amatruda, 1941) as quoted by Share & Veale. Additional comparisons are made between normal children, Share and Veale D.S. infants and the infants in the intervention programme.

Comparison of items:

A further difficulty when presenting norms for comparison with the intervention sample is found in the description of items used by different authors. It is often impossible to know exactly what behaviours are intended by the authors of the scales.

GROSS MOTOR DEVELOPMENT:

(a) Areas of accelerated development

Table 6:3 indicates that the ability to sit with head erect was achieved by the intervention sample between four and 18 weeks, with a mean of nine weeks, while Share & Veale report 5.8 months and Sheridan three months. Table 6:4 shows a median age of ten weeks for this skill. It could be suggested that the early achievement of this skill in the intervention sample was the result of daily physical exercises aimed to promote this behaviour which were begun as soon as intervention commenced.

Once head control is achieved in all positions, that is, lying, sitting and prone positions, it is then possible for an infant to begin to co-ordinate the sequence of visual and motor skills necesary for the execution of "directed hand reaching" which is the primary means by which the child can voluntarily bring objects into the immediate environment in order to further explore and act upon them.

The importance of physical development has been previously mentioned (Chapters II and IV) and the guidance given parents in exercising their infants through normal developmental patterns helped all of the children in the sample to develop flexible and controlled walking patterns around two years of age. No child exhibited the stereotyped broad based, stiff kneed gait so often seen in young D.S. children.

Similarly the skill of rolling over was achieved by the D.S. children between 12 and 30 weeks (mean 21.36) where Sheridan reports six months for this behaviour. The Share & Veale norm is 8.5 months. This accelerated development can be assumed to be a result of exercising the infants in this skill from the earliest weeks, again on a daily basis.

(b) Areas of normal development

Crawling occurred between 30 and 92 weeks (mean 56.90) and walking between 68 and 120 weeks (mean 90.90). The median age for walking for the intervention group was 88 weeks, although two children were walking at 68 and 76 weeks respectively, which according to Shirley still allows them to be classified at the upper end of the normal range (vid. Table 6:4). The range of normality quoted by Illingworth is very great indeed (vid. Table 6:4).

It can be seen that the skills of crawling and walking, which allow the infant to explore his/her world independently were achieved at an earlier age than those norms reported by Share & Veale. To achieve the major milestone of independent walking by the second birthday virtually allows the child to remain with the peer group, and in fact to be only slightly behind those few normal children who walk after 18 months of age.

As can be seen from Table 6:3, in the area of gross motor skills the intervention sample consistently achieved developmental tasks at an earlier age than the children observed by Share & Veale. The table further indicates that the progression of developmental tasks from simple (for example, rolling over) to complex (walking unaided) was developed by the intervention sample in an hierarchical pattern. There were no gaps or missing skills apparent in

this group. Trunk rotation, which has been suggested by Lydic & Steele (1979) as being of critical importance for controlled and flexible walking patterns, was achieved by these children before the acquisition of the more complex behaviours of standing and walking.

FINE MOTOR DEVELOPMENT: (ADAPTIVE)

As can be seen from Table 6:3 the only fine motor skill which can be compared with existing norms is that of transferring objects. The intervention group achieved this task at a mean age of 28 weeks. Share and Veale report an average of 11.4 months. Normal children can be seen to acquire this skill at six months of age, just slightly different from the intervention sample.

As with gross motor development, it can be seen from the table that the developmental tasks achieved by the intervention sample progress in ordered sequence from simple to complex. The coordination of these skill areas can be seen when examining the ages at which types of skills occur. For example, by the time all the intervention sample children were able to sit (mean age 30.72 weeks) they could also use their eyes to track and regard objects (mean age 16.0 weeks), their hands to manipulate objects (mean age 28 weeks) and their ears to respond to auditory stimuli (mean age 8.5 weeks).

The importance of the concept of the object for intellectual development has previously been mentioned

(Chapter II page 98) and it is interesting to note from Table 6:3 that the mean age for attaining this skill in the intervention group was 29.45 weeks with a range of 17-40 weeks. To have mastered the primary forms of this concept (Sigel, 1974, suggests it is an ongoing cognitive activity) before nine months of age allowed these infants to move competently into the sensorimotor stage described by Piaget as "Co-ordination of Secondary Circular Reaction Schemas", which is characterised by the perfecting of the separation between means and ends. In order to develop a concept of the object the child must first be accomplished in earlier skills such as head and shoulder girdle stability, visual tracking, focusing, regarding objects, hand-eye co-ordination and intention to act. Without these pre-requisite skills the ability to explore "means - ends" relationships cannot occur.

Grasping Skills:

The series of tasks characterised by skills of "take", "put" and "release" provide an interesting result. As can be seen from Table 6:3 the pre-requisite skill of pincer grasp was achieved between 36 and 56 weeks with a mean age of 47.0 whereas the ability to release an object from that grasp occurred at mean ages of 60.50 for "peg in a can", 65.0 for "rings on a stick" and 68.0 for "peg in a hole". The longest delay was an average of 21 weeks between development of pincer grasp and ability to release from that grasp when placing a peg in a hole.

During the weekly intervention session, parents often became discouraged with their children's delay in mastering this final sequence of an otherwise competent action. However, constant reassurance by the professional staff, as well as parents' observance of older children who had mastered the skill despite similar delays, allowed parents to continue to promote this activity without the rewards of seeing their child succeed. As can be seen from the table, the children's ability to conclude this skill occurred with consistency across various types of release actions with varying objects, and with the acquisition of this skill came the ability to engage in a further level of developmental tasks, for example, placing of circles in circles, building a tower of two blocks.

Summary of Fine Motor Skill Development:

In the general area of fine motor co-ordination, it is evident from Table 6:3 that the ability to hold and scribble with a crayon follows on the acquisition of hand-eye co-ordination in directed reaching, separation of fingers from thumb in order to hold and move the crayon as well as the ability to sit with head and trunk erect and balanced.

It is suggested that the guidance the parents have been given in promoting fine motor skills in their children alongside all other aspects of development has allowed all the children in the sample to master the basic skills by two years of age. As with normal children one must expect a range of ages at which skills are credited. As has been mentioned, it

was often difficult to be accurate in crediting skills for the D.S. children and therefore too much emphasis should not be placed on variations within the group. Factors which are influential in retarding progress include physical health, muscle tone, visual impairment, low level of responsivity in the early months. The important factor to note is that all children were introduced to the skill areas and they continued to be worked on by their parents until these were achieved, resulting in all children attaining the end of the specified progression by age two. It was considered to be more important that the skills were acquired within general developmental progress during the two year period than that they were achieved at rigidly specified ages. "Sleeper" effects may have occurred between the introduction of a skill and the observance of it in the child's behaviour, in addition to the influential factors mentioned above.

LANGUAGE : EXPRESSIVE AND RECEPTIVE:

Comparisons of the intervention group with Share & Veale and Sheridan norms can be made in only a few categories. As can be seen from Table 6:3 "laughs aloud" was achieved by the intervention sample at a mean age of 13.3 weeks with a range of 10-20 weeks. Share & Veale quote 6.9 months. The norm for normal infants is 3 months, a figure closely approximated by the intervention sample.

Laughing aloud is suggested (Cicchetti & Sroufe, 1976; and Cicchetti, 1978) as being critical in the development of intelligent behaviour. Table 6:4 shows the median ages for the emergence of laughing and again an accelerated score is evident for the intervention sample. It could be suggested that this result reflects not only the high level of face-to-face interaction which is encouraged between D.S. infants and their caregivers but also the specific encouragement of this response through specific activities (vid. Appendix B).

Another comparison can be made between normed groups on responses to simple commands. Infants of the intervention sample were able to carry out simple responses to "look", "take", "put" and "give" at the following mean ages: 30.18, 55.36, 58.09, 54.72. Pointing to a named body part occurred at 67.27 weeks.

It is difficult to know exactly what is meant by the equivalent item in Share & Veale and Sheridan norms, as "obeying simple commands" may mean merely responding to "give it to me", or may involve a more complex skill such as "take the ball out of the box". Therefore comparisons with Share & Veale (29.4 months) and Sheridan (12-18 months) must be very tentative. It is possible to state however that by 16 months mean age the intervention D.S. children were able to point for example to ears, eyes, nose, tummy or hair. Such skills involve co-ordinated actions as well as simple responses to commands.

In the area of expressive language the table shows an accelerated development of the beginnings of babbling in the intervention sample. The mean age for "dada" is 33 weeks and for "mama" 43 weeks. In the Share & Veale sample the mean age for "mama" and "dada" combined is 15.4 months and for Sheridan it is nine months. These results suggest that it is possible for D.S. children to begin babbling within normal limits, the range being 28-50 weeks. As is evident in the table, this babbling was followed in the intervention sample by a succession of further vowel sounds during the succeeding few months, culminating in the beginnings of true language with the use of "mama" or "dada" directed specifically to one person by a mean age of 65.50 weeks (16 months).

PERSONAL-SOCIAL:

Table 6:3 shows smiling occurring in the D.S. sample between 4-15 weeks responsively and 5-17 weeks spontaneously. Sheridan describes the range as between four and six weeks for normal children while Share & Veale report 3.6 months. Shirley reports 3 1/2 to 7 weeks and Illingworth reports three days to seven weeks.

Although it is not possible to ascertain whether Share & Veale or Shirley refer to "spontaneous" or "response" smiling it is evident that the D.S. sample (with the possible exception of subject K) falls within normal limits for both smiling behaviours. Subject K who scores lowest (15 and 17

weeks for responsive and spontaneous smiling) was hospitalised with a chest infection before three months of age which may have delayed the appearance of smiling behaviour or alternatively delayed the recording of the behaviour.

Further comparisons can be made for such developmental tasks as "drinks from a cup" and "feeds self fully" (approximately equated with "uses a spoon" which was the intervention sample task). Drinking from a cup was attained by the D.S. sample at a mean age of 50.3 weeks, the range being between 34 and 60 weeks.

Such results closely approximate those cited by Sheridan (12 months) and are considerably better than those cited by Share & Veale (30.1 months).

As with smiling behaviours it is evident that D.S. children can perform normally the personal-social skills of eating and drinking well within normal limits (thus allowing them to be undifferentiated from their peers in this regard). With regard to "feeding self fully" it is obvious that this involves more complex and sustained behaviours than merely using a spoon; however, ability to control the spoon and the intention necessary to use it to eat with are the first stages of such an activity and as can be seen from Table 6:3 these were achieved by the D.S. sample at a mean age of 55.1 weeks. The range in this case was very great with one child achieving the skill by 28 weeks. The other end of the range was 96 weeks, a score which is still within normal limits according to the Sheridan norms.

As can be seen from the table, the beginnings of reciprocity in human interactions is evidenced by the ability to participate in simple games such as "peek-a-boo" and "pat-a-cake". This reciprocity was well established in all children by approximately one year of age, some children displaying such skills by 28 and 30 weeks and the greatest length of time before such skills were accomplished being 58 weeks.

PATTERNS OF DEVELOPMENT

The average results set out in Table 6:3 and discussed in the previous section tend to obscure the fact that individual children varied considerably in their patterns of development. It was not just a simple process of advancing from one level of skill to the next with the more advanced children proceeding more rapidly than the others.

There are two ways of identifying the different patterns of development that occurred within the intervention sample. One is to examine the intercorrelations between the major developmental skills and the other is to examine the progress of individual children to identify contrasting patterns. Both methods have been used here.

(a) Intercorrelations between Major Developmental Skills

The correlations (Pearson Product Moment) between the ages at which the children were observed to achieve some of the major developmental skills have been reported in Table 6:5. The first three are large motor skills (sits alone, crawls, walks alone). The next three represent the fine motor skills with special adaptive significance. Babbling represents an early language skill and the last two are signifiant personal-social skills.

Care should be taken in the interpretation of Table 6:5. The number of children involved was quite small (N = 11) so that correlations reported cannot be considered very reliable. Those correlations which are significantly different from zero have been marked with asterisks. The probable standard error of the correlation coefficients reported in the table is about 0.30.

It seems the correlations reported in Table 6:5 suggest that there were relationships between the development of:

(i) sitting alone and crawling

(ii) developing a pincer grasp and learning to look for a dropped object

(iii) smiling responsively and laughing

TABLE 6 : 5

PATTERNS OF DEVELOPMENT

Correlations between major developmental behaviours

	Correlations (decimal point omitted) (N = 11)								
	1	2	3	4	5	6	7	8	9
Sits alone		56**	16	-12	07	17	02	-31	-12
Crawls			40	-02	-02	26	-12	24	01
Walks alone				-50**	-55**	-01	26	-30	-02
Looks for dropped object					79**	03	-49*	12	-20
Pincer grasp						07	-33	-13	-33
Take/release							43*	33	14
Babbling								09	41*
Smiling Responsively									62**
Laughing									

* p < .10

** p < .05

In addition, it seems that those children who learned to walk early were later in developing a pincer grasp and learning to look for a dropped object. Early development of babbling appears to have been similarly related to the slower development of these same two skills.

(b) Individual Patterns of Behaviour

A detailed examination of the individual patterns of development of the children in the intervention programme indicated that there were in fact some children who showed a significant disparity between areas of physical development and areas of cognitive development. A significant delay in one area was apparently counteracted by significant advance in the contrasting area.

The following case studies illustrate the nature of this difference in patterns of development. Subject I represents a child who showed advanced development in all areas. He provides an example of a very successful pattern of development and a "normal" contrast for the patterns shown by the other two children. Subject L is an example of a child who was slow in developing physical skills but was advanced in cognitive skills while Subject G is an example of the opposite pattern.

Subject I : (Vid. Appendix A)

This infant was able to lift his head 45° in prone by four weeks (three wks)* to fixate on an object at four weeks and turn to sound. He could regard his mother's face at five weeks and was smiling responsively by eight weeks (nine wks). (This subject was born three weeks prematurely). At 12 weeks he could sit with his head steady, follow objects 180° in all positions and respond to his mother's voice, laughing aloud and grasping objects. Sitting was achieved by 25 weeks (31 wks), crawling by 36 weeks (44.5 wks) and walking unaided at 88 weeks (66.0 wks). By 26 weeks this subject could look for a dropped object, hold two objects, transfer from hand to hand (25 wks) and respond to "look", and play "peek-a-boo" (41 wks). He could also feed himself a cracker at 27 weeks and babble "dad-dada" at 32 weeks. At 33 weeks he could point to pictures in books, achieving the finer pincer-grip skill at 40 weeks. "Take", "put" and "release" skills were accomplished by 66 weeks, imitating a "tipping out" behaviour by 44 weeks. At 50 weeks he could respond to simple commands, for example, "look" and "give", and by 64 weeks could point to his nose. He could play ball at 48 weeks, and by one year could drink from a cup, use a spoon, imitate housework (for example, wiping up spilt milk on high chair tray), play ball involving returning a ball when it was rolled to him and could remove an article of clothing when asked to (for example "take off your

* The average for normal children is given in parenthesis, where applicable, for comparison (Shirley 1933 p.40). Although as has been previously mentioned, any comparisons are of limited value due to the lack of definition of the exact nature or quality of the specified behaviours of normal development.

hat"). By 19 months (66 weeks) this infant was walking competently, using more than three words, obeying simple commands, manipulating objects using fine motor skills, playing reciprocal games and feeding himself.

This subject was the first-born in his family together with a twin brother. His milestones were achieved within normal limits and were competently accomplished. His physical health was excellent and he did not have any physical difficulties or abnormalities.

Parents were rated 4 and 5 for S.E.S. Father was a carpenter and mother a nurse aide.

Subject L : (Vid. Appendix A)

This infant was the slowest of the intervention sample to achieve independent walking. When one considers her gross motor development (vid. Appendix A) it is apparent that the earlier skills involving the head and trunk were not significantly delayed. For example, she achieved head control on extended arms in prone position by 12 weeks, head lag had disappeared by 10 weeks, sitting was achieved by 34 weeks.

Despite early weight bearing the later skills involving hands-and-knees crawling, pulling-to-stand, walking around furniture were slower than for the other children. For example, cruising right and left were achieved at 100 weeks. By comparison the earliest this skill was attained by any

child was 40 weeks and the child next slowest to Subject L achieved it by 80 weeks. Subject L had very reduced muscle tone in her lower limbs. Her ankle and knee joints were very flexible and difficult for her to stabilise in a standing position. Her earliest movement pattern was that of "bottom shuffling". She was continuously encouraged to attempt movement from a prone position and finally achieved this action at 92 weeks. When independent walking was established at 100 weeks it appeared a flexible competent skill.

When examining the other areas of development in this subject a completely different pattern is apparent. Appendix A shows a more even development of fine motor skills, progressing at an even pace near the average for the intervention sample. For example, she achieved grasping at 12 weeks, sitting up at 25 weeks, transferring objects at 36 weeks, pincer grasp at 36 weeks, scribbling at 52 weeks.

In the area of receptive language she was able to respond to simple commands such as "look" at 18 weeks which was the earliest time at which this skill occurred in the intervention sample. She was able to point to a named body part at 64 weeks, three weeks less than the mean for the intervention sample.

The expressive language developed by this child was also close to the intervention sample mean. Babbling occurred by 28 weeks (the earliest in the sample) and by 34 weeks she could produce a range of vowel and consonant sounds.

In the area of personal and social development, smiling was observed by 9 weeks, playing peek-a-boo by 33 weeks and playing ball by 32 weeks. She was able to use a spoon and cup by 28 and 56 weeks respectively. Both parents' S.E.S. was rated 3, father being a clerical worker and mother a registered nurse.

This child's development could be described as uneven. There was a delay in gross motor skills and a more normal progression of competencies in all the other areas of growth. It seems likely that the flaccidity of the muscles in her lower body, in conjunction with the loose ligaments of the ankle and knee joints, contributed to this delay. On the other hand she may have had a predisposition towards a "bottom shuffling" mobility which would have delayed walking. As her fine motor, language and personal-social skills were not delayed, she appeared to function at the same level of competency as the previous child (Subject I) when walking finally occurred.

It could be suggested from looking at the development of this infant that any intervention programme should ensure that equal emphasis is given to all areas of development despite delayed gross motor development. As has been mentioned earlier in the study (Chapter II, p.92) the co-ordinated sequence of development which should occur at the end of the sensorimotor period (approximately two years) appears to be of more importance than the actual ages at which developmental milestones are accomplished.

Subject G : (Vid. Appendix A)

This child presents a pattern opposite to that of Subject L. In this subject gross motor physical skills were achieved sooner than average, but the other developmental skills were not. This infant, despite hospitalisation for six months, was walking independently by 68 weeks. The gross motor skills which preceded walking were difficult to assess because the intervention team's visits to Karitane Hospital during the infant's stay there were infrequent. Intervention procedures involved using these visits to explain to the staff the developmental skills requiring to be practised with this child. It appeared easier for them to comprehend and carry out physical interventions such as positioning, sitting and standing than it did for them to engage in interactive sequences designed to stimulate cognitive, language and social skills. It is apparent from Appendix A that these skills were slower to develop than they were for other infants in the intervention sample. Such skills could only be satisfactorily tested and charted after the child became fostered within a single parent family at six months of age and began regular attendance at the intervention clinic. Skills such as "rings on a stick" (including release), scribbling, building a tower of two cubes, were not acquired until approximately 88 weeks (vid. Appendix A). This subject was the latest to acquire the majority of these types of fine motor skills. Likewise, language and personal-social skills were amongst the slowest to develop within the intervention sample. Whilst the emergence of these later skills could not be considered

markedly late, they were consistently slower in general than for other children and were observed to lag behind the acquisition of gross motor abilities.

Reasons which may be advanced for this discrepancy in development are as follows:

(i) Consequences of insufficient sensory, fine motor and language stimulation during the early period of the infant's hospitalisation.

(ii) The type of intervention offered the child by the foster mother may have differed slightly in that she had never raised a baby before and, although committed to intervention with this child, found it easier to carry out the physical than the cognitive activities for the first year of the child's life.

CONCLUSIONS AND IMPLICATIONS OF THE TEACHING OF DEVELOPMENTAL SKILLS WITHIN THE INTERVENTION PROGRAMME

The results in this section indicate that the intervention procedures demonstrated to the parents to implement with their children support the focus of the study. They improved physical development (gross and fine motor) and they initiated the beginnings of language and personal-social skills in the sample children.

Compared with the Share & Veale norms the infants showed accelerated development in all developmental areas, the areas of greatest advance being language and personal-social. Smiling, laughing aloud and imitating speech sounds were considerably advanced in the intervention sample. Similarly, feeding and drinking from a cup independently can be seen to be much more advanced than the Share & Veale norms.

In the area of cognitive development "obeys simple commands" is achieved considerably earlier than for the Share & Veale sample.

The areas of least advance when compared with these norms are gross motor (with the exception of "sits head steady"). However in most cases there is still considerable improvement (up to six months) in attainment of these skills.

When compared with the Sheridan norms it is evident that the following skills were actually attained a little earlier than normal: "rolls over", "sits", "imitates speech sounds", "drinks from a cup". Smiling and laughing aloud occurred at approximately the same time as with normal children. It could be suggested from these results that the specific teaching by the families of the D.S. infants in this area (vid. Appendix B) has resulted in accelerated affective responses.

The areas of development which show the greatest departure from normal are in the gross motor areas of "pulling to stand", "cruising" and "walking alone". Although Sheridan quotes 13-14 months as the norm for walking unaided, Shirley in her 1931 study of 21 normal babies gives a median of 64 weeks and a range of 50 to 76 weeks for attainment of this skill. It must be assumed that delayed walking alone must be at least in part due to reduced muscle tone, stability of hips, knees and ankles and balance reactions in children with D.S. Despite these obvious difficulties two of the sample children fell within the upper limits of the range stated by Shirley for this skill.

As has been mentioned previously comparisons with some items of Share & Veale and Sheridan norms are inappropriate because of lack of clarity of the exact nature of the skill, for example "feeding self fully", "combining two to three words", "obeys simple commands".

It is perhaps easier to see the short term effects of intervention in the area of gross motor development where walking unaided has occurred. This skill is known to be the important physical milestone for all children. Less obvious during the two year period will be the effects of language and cognitive stimulation. The effects of intervention will need to be considered over a longer period of time, including entry to pre-school experience.

MEASURE OF CAREGIVER BEHAVIOUR AND ATTITUDE

Although this section focuses on the child's developmental progress, second-order effects occur which affect the parents' attitudes towards their children's progress. The effects of parent involvement will be discussed in the next section.

THE H.O.M.E. SCALE

Procedures and Reliability

The H.O.M.E. scale was administered to all children in both the contrast and intervention groups. In order to obtain a measure of reliability between testers two qualified independent testers were used. Tester I administered the H.O.M.E. scale to the intervention sample. Tester II administered the scales to the contrast group and to the intervention group 12 months after the first child was tested. This resulted in a time lapse between Tester I and Tester II testing the intervention sample of between one and twelve months. A Spearman-Rank Order Correlation was computed on the total scale score between Tester I and Tester II resulting in a reliability coefficient of r=.89.

A further Spearman-Rank Order Correlation was computed between Tester I and Tester II following the extraction of those items which were affected by developmental change during the time interval between testing. The items eliminated were:

Item 5: Messy Play

This activity was likely to be more appropriate for a 2 to 2 1/2 year old. Parents attitudes towards this behaviour may have altered after 16 months of age.

Item 15: Physical Punishment

Item 17: Restriction of Physical Environment

As no children were walking independently by 16 months of age, parents were less likely to be restrictive or punitive at or before this age. Mobility of the 2 to 2 1/2 years old may have altered parental attitudes towards these restrictive measures. Removing these items resulted in an inter-judge reliability for the total score of r=.92.

These coefficients indicate a substantial measure of agreement between the two testers who administered the H.O.M.E. scale to the two samples of children.

The availability of data from the contrast group made it possible to evaluate the changes which had taken place in the parents of the intervention sample by comparing their scores with those obtained from the parents of the contrast group.

The means, standard deviations and ranges of the scores obtained from the two sets of parents are set out in Table 6:7.

TABLE 6 : 6

AGES AT TESTING ON H.O.M.E. SCALE

(Intervention and Contrast Groups)

	Subject	Age at First Testing	Age at Second Testing
INTERVENTION GROUP	A	16 months	3 years 5 months
	B	16 months	3 years 4 months
	C	17 months	3 years 4 months
	E	17 months	2 years 11 months
	F	16 months	3 years 2 months
	G	18 months	3 years 1 month
	I	16 months	2 years 5 months
	J	16 months	2 years 3 months
	K	17 months	1 year 10 months
	L	17 months	1 year 11 months
	M	18 months	1 year 10 months
	Range	16-18 months	1 year 10 months- 3 years 5 months
	Mean	16.72 months	2.43 years

When analysing the H.O.M.E. Scales the means and the standard deviations were calculated. To test for the significance of difference between the means of the two groups the student's t test was used. The level of probability selected to establish a statistically significant difference between the means of the two groups was $p < .05$.

Although two sets of scores were obtained for the intervention group, only the first set (Tester I) was used for analysis, as in it the ages at testing were homogeneous (vid. Table 6:6). Table 6:6 describes the ages at testing for the intervention group children (two assessments) and for the contrast group children (one assessment).

Examination of the averages and the range of scores obtained on each of the scales indicates that there are very few differences between the two groups on these measures. When the total scores are compared, the average and range for both groups are almost identical.

There are two possible explanations for these results. Either there were no differences between the behaviour of the two groups of parents, or this particular set of observational scales was insensitive to the range of differences in relevant caregiving behaviour which did exist. The scores reported in Table 6:7 suggest the latter interpretation. Almost all the scores obtained by the two groups of parents were close to the top of the scales. This meant that any variation between

TABLE 6 : 7

H.O.M.E. INVENTORY FOR MEASUREMENT OF THE ENVIRONMENT

Comparison of Groups

CATEGORY	Intervention (N = 11) Mean	S.D.	Range	Contrast (N = 4) Mean	S.D.	Range	T VALUE
1. Emotional and Verbal Responsivity of Mother	9.63	1.20	7 - 11	10.75	0.50	10 - 11	-1.89
2. Avoidance of Restriction and Punishment	7.09	0.70	6 - 8	7.00	0.81	6 - 8	0.21
3. Organisation of Physical and Temporal Environment	5.63	0.67	4 - 6	6.00	0.00	6 - 6	-1.05
4. Provision of appropriate play materials	9.00	0.00	9 - 9	8.500	0.577	8 - 9	3.09*
5. Maternal involvement with child	5.90	0.30	5 - 6	5.75	0.50	5 - 6	0.76
6. Opportunities for variety in daily stimulation	4.63	0.50	4 - 5	4.00	1.15	3 - 5	1.54
TOTAL Score for H.O.M.E. Inventory	41.90	1.57	38 - 44	42.00	2.82	38 - 44	-0.08

* significant at $p < .05$

parents was reduced to a maximum of one or two score points. The previous discussion (pp. 226) of the validity of the H.O.M.E. scales indicated that the average score for parents in low income families ranged from 28.7 to 34.5. Studies involving middle income families reported total scores of 37.5 to 40.6. The one available New Zealand study (McMillan, 1981) reported total scores of 38.4 to 40.4. Compared with total scores of 41.9 and 42.0 obtained in this study these results suggest that the H.O.M.E. scale is not appropriate to studies of New Zealand homes, and may not be appropriate to studies of any middle class homes.

Although there were many reasons for including the H.O.M.E. scales in this study (vid. pp.139-143) the results indicate that, used in New Zealand conditions with parents from a range of income levels, it has a marked ceiling effect making it insensitive to any variations which might exist between the behaviour patterns of caregivers.

A.B.C. Scale : (vid. APPENDIX D)

Procedures and Reliability

The A.B.C. scale was administered by two independent trained observers, one of whom observed the intervention sample with the other observing the contrast sample. It was administered in the child's home at a pre-arranged time suitable to the caregiver and the D.S. child. The average age of the children at administration was two years ten months

(range two years to three years seven months) for the intervention group and two years four months (range one year eight months to two years 11 months) for the contrast group (vid. Table 6:8).

As the intervention and contrast groups were assessed by different observers an interobserver reliability check was carried out using a third observer who tested some three mother-child pairs (two from the intervention group and one from the contrast group). The correlations (Spearman Rank Order) between the total scores obtained by the three observers from the three mother-child pairs were as follows:

Observers 1 and 3	$r_s = .93$
Observers 1 and 2	$r_s = .85$
Observers 2 and 3	$r_s = .85$

The agreement between the observers was considered to be at a satisfactory level for purposes of the present study.

The procedure used by the observers was as follows. At the beginning of the observation session a small box of toys was given to the mother to show to her child. The toys used were identical for both groups. The toys chosen were designed to provide the caregiver with opportunities for eliciting Piagetian sensorimotor behaviours. The toys used were:-

Simple posting box

Ball, (six inches in diameter)

Doll and blanket

Picture book

TABLE 6 : 8

A.B.C. SCALE AGE OF D.S. CHILD AT TIME OF OBSERVATION

INTERVENTION GROUP	
Subject	
A	3 years 7 months
B	3 years 6 months
C	3 years 6 months
E	3 years 1 month
F	3 years 4 months
G	3 years 3 months
I	2 years 7 months
J	2 years 5 months
K	2 years
L	2 years 1 month
M	2 years

CONTRAST GROUP	
Subject	
1	2 years 11 months
3	2 years 7 months
6	1 year 8 months
7	2 years 2 months

Toy telephone

Small truck with tray

Small blocks (four)

In order to minimise distraction during observation periods each observer used a cassette of structured "bleeps" indicating two minute intervals (one minute record, one minute rest) in conjunction with ear phones during the session. Total observation time equalled 30 minutes, a slightly longer time than that used by Honig & Lalley.

Comparisons with other norms

There are no norms available for comparison.

Comparisons between the Intervention and Contrast Groups

The following section is concerned with the comparison of the behaviour observed in the parents of the intervention sample and the behaviour observed in the contrast sample. Again, it should be noted that the small size of both samples makes the reliability of comparisons relatively weak. This is especially true of the contrast group where any deviations in one parent's observed behaviour could make a significant alteration to the group average or range. Each of the scales will be considered separately.

The results obtained by the two groups of children on the A.B.C. scales are reported in Tables 6:9 to 6:13. Each

table reports the scores obtained on the individual items in a particular scale. The figures given represent the percentage of time during the observation period that the caregiver was observed to engage in particular behaviour.

Language Facilitation (Table 6:9)

The means, standard deviations and range of scores on the language facilitation items are reported in Table 6:9.

In order to help with the comparison of scores, the t statistic has been calculated and the statistical significance of the difference between the two groups determined using a procedure for small samples of unequal size. (Described by Hays 1963 p. 322). It is important to note, however, that this t statistic can only produce an approximate guide to the reliability of the differences apparent in the table.

Many of the conditions normally required for using the t statistic were not present in this study. For example, the two groups were not randomly selected from a larger sample. They did however represent the total population available at the time the study was carried out. However, in so far as the means and standard deviations obtained in this study do represent the means and standard deviations that would be obtained in any future replication of the same intervention procedures, then the t statistic provides a useful means of identifying those differences which are the most reliable of all the differences between the two groups evident in the data.

TABLE 6 : 9

CAREGIVER SCALE (A.B.C.) : LANGUAGE FACILITATION

	Intervention Group			Contrast Group			Significance of Difference*	
	Mean	S.D.	Range (%)	Mean	S.D.	Range	t	p
1. Elicits vocalisation	22.38	18.90	0-66.6	4.97	5.51	0-13.3	2.6	.05
2. Converses with infant	89.67	10.40	73.3-100	83.3	11.06	66.6-93.3	0.9	n.s.
3. Praises or encourages child	57.53	20.74	13-86.6	46.65	8.16	40-60	1.3	n.s.
4. Offers help or solicitous remarks	47.24	15.93	20-80	29.97	7.45	20-40	2.6	0.5
5. Enquiries of child - requests	56.34	27.03	13.3-100	64.97	9.86	53.3-80	0.8	n.s.
6. Gives information, explanation of culture rules	37.55	30.25	0-93.3	19.95	10.54	6.6-33.3	1.6	n.s.
7. Labels sensory ~~expenses~~ experiences SEE ERRATA	4.81	7.54	0-26.6	3.32	5.75	0-13.3	**	
8. Reads to or shows pictures	19.37	13.46	0-53.3	8.30	7.27	0-20	1.9	n.s.
9. Sings to or plays music for	0.6	1.89	0-6.6	0	0	0	**	

* In this and subsequent tables of results for the A.B.C. Scales, the t statistic has been calculated using the procedure described by Hays (1963, p. 322) for samples of unequal size where it is not possible to assume that the variances of the two populations being compared, are equal. The procedure involves calculating a revised "degrees of freedom" for testing the significance of the t statistic.

** Not enough observations in one or other group to make a sensible comparison.

It is interesting to note from Table 6:9 that there is virtually no difference in the means of both groups for amount of time spent conversing with infant. The range and standard deviation are likewise very similar. However, when one looks at the item elicits vocalisation, it is apparent that there is a significant difference between the two groups. Only 4.97% of that time was spent eliciting vocalisation in the contrast group while 22.38% of the time was spent in the intervention group. The intervention group mothers spent more time giving explanations, information or culture rules (mean = 37.55%); reading to and showing pictures (mean = 19.37%) than did the contrast group mothers although these differences were not statistically significant. The contrast group mothers spent slightly more time enquiring of child or requesting child. Offers of help or solicitous remarks were a much more common occurrence in the intervention sample (mean 42.24% vs. 29.97%) a difference which was statistically significant. Praise or encouragement and labelling of sensory experiences showed very little variation between the groups, whereas sings to or plays music for was completely absent in the contrast group and only occurred a small amount of the time in the intervention group.

In summary, it can be seen from the table that, although there was no observed difference in the total amount of time that the mothers in the two groups spent conversing with their infants, there were two types of language behaviour in which there were significant differences. Mothers of

children in the intervention group spent more time eliciting vocalisation from their children and spent more time offering help and making solicitous remarks.

Social and Emotional Positive Inputs: (Table 6:10)

SEE ERRATA There were ~~to~~ two types of positive social emotional behaviours for which there was a statistically significant difference between the two groups. The mothers in the intervention group were observed to play social games with the child more frequently than mothers in the contrast group and were also observed to use eye contact more frequently. The mothers in the intervention group also appeared to smile more frequently and to use loving and reassuring tones more often. These differences were not reliable given the small size of the groups and the considerable overlap between them.

There were two other behaviours where there appeared to be a marked difference (smiles at child and uses loving or reassuring tones). However, the very uneven distribution of scores in the two groups means that these differences could not be treated as statistically reliable.

When one looks at the categories of language facilitation and social emotional positive inputs together, there appears to be a difference in the pattern of interaction that occurs between mother and child in the two groups. Mothers in the intervention sample were observed to engage in the following behaviours more frequently than mothers in the contrast group:

TABLE 6 : 10

CAREGIVER SCALE (A.B.C.) : SOCIAL EMOTIONAL POSITIVE INPUTS

		Intervention Group			Contrast Group			Significance of Difference	
		Mean	S.D.	Range (%)	Mean	S.D.	Range (%)	t	p
1.	Smiles at child	84.20	13.72	60-100	38.3	29.20	0-80	2.6	n.s
2.	Uses loving or reassuring tones	92.09	9.37	66.6-100	68.3	30.31	20-100	1.3	n.s
3.	Provides physical loving contact	32.69	17.86	6.6-60	39.97	18.26	13.3-60	0.6	n.s
4.	Plays social games with child	35.74	16.87	13.3-60	8.3	7.27	0-20	4.0	.01
5.	Uses eye contact	35.11	13.36	13.3-60	1.65	2.85	0-6.6	7.4	.01

* In this and subsequent tables of results for the A.B.C. Scales, the t statistic has been calculated using the procedure described by Hays (1963), p. 322) for samples of unequal size where it is not possible to assume that the variances of the two populations being compared, are equal. The procedure involves calculating a revised "degrees of freedom" for testing the significance of the t statistic.

(i) Eliciting vocalisation

(ii) Offering help or solicitous remarks

(iii) Use of eye contact

(iv) Playing social games with the child

(v) Using loving or reassuring tones

(vi) Smiling at child

It could be suggested that it is the quality and variety of the language experience a child has with his/her mother or caregiver which is more important than the amount of time spent talking to a child, or the mere provision of physical loving contacts.

Presentation of Piagetian tasks and opportunities for sensorimotor development

It can be seen from Table 6:11 that the mothers in the intervention sample engaged in object permanence activities with their children more frequently than did mothers in the contrast group. The contrast group had a mean of 3.32% and a range of 0-13% whereas the intervention group had a mean of 29.66% and a range between 13.3% and 66.6%. Similarly, opportunities for means ends experiences, imitation, and causality occurred much less frequently in the contrast sample although only imitation was statistically significant. Prehension, space, and new schemas were not observed at all in the contrast group.

TABLE 6 : 11

CAREGIVER SCALE (A.B.C.) :
PRESENTATION OF PIAGETIAN TASK AND OPPORTUNITIES FOR SENSORIMOTOR DEVELOPMENT

	Intervention Group			Contrast Group			Significance of Difference	
	Mean	S.D.	Range (%)	Mean	S.D.	Range	t	p
1. Object Permanence	29.66	14.30	13.3-66.6	3.32	5.75	0-13.3	4.7	.01
2. Means and ends	22.39	17.35	6.6-66.6	16.62	5.72	13.3-20	0.9	n.s.
3. Imitation	35.72	21.12	6.6-66.6	14.97	2.90	13.3-20	3.0	.05
4. Causality	4.21	7.64	0-26.6	3.3	3.3	0-6.6	0.3	n.s.
5. Prehension	9.05	9.54	0-33.3	0	0	0	**	
6. Space	26.64	14.19	13.3-66.6	0	0	0	**	
7. New Schemas	7.23	5.99	0-20	0	0	0	**	

* See note for Table 6 : 9

** Not enough observations in one or other group to make a sensible comparison

Opportunities for space experiences within the intervention group occurred frequently with a mean of 26.64% and a range between 13.3% and 66.6%. Intervention mothers were therefore observed more frequently to provide opportunities, or to take advantage of existing opportunities for spatial relationships in their interactions with their children.

Social-Emotional Negative Inputs and Caregiving Routines

As can be seen from Tables 6:11 and 6:12, the remaining categories of:

Social-emotional inputs negative
Caregiving routines with child
Caregiving routines with environment
Physical development
Does nothing

did not reveal any statistically significant differences between the two groups.

It can be seen from Table 6:12 that the behaviours listed under Social Emotional Negative inputs occurred relatively infrequently in both groups.

Table 6:13 indicates that the only caregiving routine involving the child which occurred with any frequency was "eye checks on the child's well-being". Mothers of children in the

TABLE 6 : 12

CAREGIVER SCALE (A.B.C.) :
SOCIAL EMOTIONAL NEGATIVE INPUTS

	Intervention Group			Contrast Group		
	Mean (%)	S.D.	Range (%)	Mean (%)	S.D.	Range (%)
1. Criticises verbally and scolds	1.8	2.93	0-6.6	0	0	0
2. Forbids - negative commands	9.67	6.57	0-20	4.97	5.51	0-13.3
3. Acts angry, is physically impatient and frowns	1.2	2.54	0-6.6	0	0	0
4. Restrains child physically	0	0	0	0	0	0
5. Punishes physically	0	0	0	0	0	0
6. Isolates child	0	0	0	0	0	0
7. Ignores child when child shows needs for attention	0	0	0	1.65	2.85	0-6.6

NOTE: It was considered inappropriate to test for the statistical significance of the differences between the two groups for the behaviours recorded in this table because of the very low frequences with which they occurred.

TABLE 6 : 13

CAREGIVER SCALE (A.B.C.) : CAREGIVING ROUTINES

	Intervention Group			Contrast Group			Significance of Difference *	
	Mean	S.D.	Range (%)	Mean	S.D.	Range (%)	t	p
WITH CHILD								
1. Feeds	6.64	8.97	0-26.6	4.97	5.51	0-13.3	0.4	n.s.
2. Diapers, Toilets	0	0	0	1.65	2.85	0-6.6	**	
3. Dresses, Undresses	0	0	0	0	0	0	**	
4. Washes, Cleans	1.80	4.09	0-13.3	3.3	3.3	0-6.6	**	
5. Prepares child for sleep	0	0	0	0	0	0	**	
6. Physical shepherding	9.06	10.5	0-33.3	0	0	0	**	
7. Eye checks on child's well being	35.72	30.50	0-73.3	11.62	12.80	0-33.3	1.98	n.s.
WITH ENVIRONMENT								
1. Prepares food	5.43	8.89	0-26.6	8.27	2.90	6.6-13.3	0.87	n.s.
2. Tidies room or environment	1.2	2.54	0-6.6	0	0	0	**	
3. Helps other caregivers	0	0	0	0	0	0	**	

TABLE 6 : 13 (continued)

CAREGIVING ROUTINES

	Intervention Group			Contrast Group			Significance of Difference *	
	Mean	S.D.	Range (%)	Mean	S.D.	Range (%)	t	p
PHYSICAL DEVELOPMENT								
1. Provides Kinaesthetic stimulation	46.02	33.06	0-26.6	0	0	0	**	
2. Provides large muscle play	18.16	15.58	0-46.6	0	0	0	**	
DOES NOTHING	41.19	21.42	13.3-73.3	48.27	11.89	33.3-66.6	0.7	n.s.

* See note for Table 6 : 9

** The low frequency of occurrence in one or both groups made calculation of the t statistic impossible or meaningless

intervention sample appeared to make these eye checks about three times as frequently as mothers in the contrast group but the difference was not statistically significant.

The two categories of behaviour related to physical development (provides kinaesthetic stimulation, and provides large muscle play) occurred relatively frequently among the intervention group mothers (46.02% and 18.16%) while they were not observed at all among the contrast group mothers. Presumably this reflects the time spent with the mothers in the intervention programme training them in the use of activities.

Summary

Although there was no observed difference in the amount of time both groups spent conversing with their infants, the intervention group mothers used language and social contacts in a greater variety of ways than did the mothers in the contrast group. The intervention mothers were observed to play social games with their children more frequently, to use frequent eye contact and smiles and to use loving and reassuring tones more often than did the contrast group mothers.

The offering of help or solicitous remarks by mothers in the intervention group occurred more frequently than it did with the constrast group mothers.

THE P.A.A.T. INVENTORY: (vid. APPENDIX E)

Procedures and Reliability

As the inventory was used at the very end of the present study it was not possible to carry out a formal reliability check. Because it was to be a postal questionnaire the author gave it to three mothers of normal children (the same age approximately as the D.S. children) to complete. As they all appeared to answer it satisfactorily and scoring could be easily completed it was decided to proceed with the questionnaire in the study. No family in either group reported any difficulty in completing the inventory.

The inventory contains five subscales. These are:

Creativity Analysis

Control Analysis

Play Analysis

Teaching/Learning Analysis

Frustration Analysis

The means, standard deviations and ranges of the scores obtained by the two groups are reported in Table 6:14. None of the differences obtained was statistically significant, but a comparison of the scores obtained by individual mothers in both groups produced some interesting results (vid. Table 6:15).

TABLE 6 : 14

PARENT AS A TEACHER PROFILE - (P.A.A.T.)

Comparison of Groups

	Intervention Group (N = 11)				Contrast Group (N = 4)				
	Mean	S.D.	Range	Median	Mean	S.D.	Range	Median	t VALUE
1. Creativity Analysis	27.45	2.94	23 - 33	27.5	25.50	1.91	24 - 28	25.0	1.22
2. Control Analysis	26.90	2.30	24 - 31	27.0	27.50	6.028	19 - 33	29.0	-0.29
3. Play Analysis	34.36	4.032	27 - 38	36.0	32.00	2.160	30 - 35	30.5	1.10
4. Teaching/Learning Analysis	30.27	2.195	26 - 34	30.5	30.25	3.20	27 - 34	30.0	0.02
5. Frustration Analysis	29.72	3.10	25 - 37	29.1	28.50	5.066	21 - 32	30.5	0.58
TOTAL Sections 1 - 5	150.63	13.72	137 - 173		144.00	16.269	121 - 156.5	11.29	0.79

TABLE 6 : 15

P.A.A.T. : INVENTORY

Scores for Subsections

Subject	Creativity Analysis	Rank	Control Analysis	Rank	Play Analysis	Rank	Teaching Learning	Rank	Frustration Analysis	Rank	TOTAL Profile Score
INTERVENTION											
A	27	7	25	12	37	5	31	5=	29	9=	149
B	31	2	30	3=	39	1	33	3	33	2	166
C	25	11=	26	10=	30	11=	30	8=	28	11=	139
E	26	8=	24	13=	33	8	28	12=	30	5=	142
F	23	15	24	13=	34	7=	31	5=	25	14	137
G	33	1	31	2	38	2=	34	1=	37	1	173
I	30	3	27	7=	38	2=	31	5=	30	5=	156
J	28	4=	29	5	38	2=	30	8=	30	5=	155
K	25	11=	27	7=	34	7=	30	8=	28	11=	144
L	26	8=	27	7=	27	14	29	11	28	11=	137
M	28	4=	26	10=	30	11=	26	15	29	9=	139.5

TABLE 6 : 15 (continued)

P.A.A.T. : INVENTORY

Scores for Subsections

Subject	Creativity Analysis	Rank	Control Analysis	Rank	Play Analysis	Rank	Teaching Learning	Rank	Frustration Analysis	Rank	TOTAL Profile Score
CONTRAST											
1	26	8=	30	3=	36	6	32	4	32	3	155.5
3	24	13=	19	15	30	11=	27	14	21	15	121
6	28	4=	33	1=	31	1=	34	1=	30	5=	156.5
7	24	13=	28	6	32	9	28	12=	31	4	144

Analysis of Individual Parent's Scores:

Creativity:

On the creativity scale the parents of children in the intervention sample showed a greater range of scores than the parents in the contrast group. Three parents in the intervention group had higher scores than anyone in the contrast group and one had a lower score.

Control:

The opposite pattern occurs in the control scale. The parents in the intervention group have a smaller range of scores than the parents of the children in the contrast group.

Play:

The range indicates a greater spread of scores for the intervention group where nearly half the number scored higher than any member of the contrast group. It is the low score in one case (L) which lowers the average of the group. If this score is removed the intervention group average is 35.1 and the difference is marginally significant, $t = 1.7556$ ($p = < .10$)

Teaching/Learning:

The rankings of the groups show the contrast group as both having the highest and lowest scores (1 and 14).

Frustration:

The difference between the two groups is very largely created by one parent in the contrast group with a score of 21 (Table 6:15).

Total Profile Scores for the P.A.A.T. Inventory:

As can be seen from Table 6:14 the mean for total scores of the intervention group parents was slightly higher than that for the contrast group. The difference between the means was found not to be significant ($t = 0.79$). However, when one examines the total scores of the individual parents, the scores obtained by three of the parents' scores in the contrast group fall within the top half of the parents in the intervention group. The remaining parent in the contrast group falls well below all other parents bringing the average for the contrast group down.

Summary

Although the differences are not marked, it is possible to suggest from the rankings of individuals on each analysis that the intervention group ranks more consistently in the top third of subjects in creativity, control and play analysis. According to Strom this would indicate that the intervention group parents have in general a higher self perception in these areas of parent-child interaction. In particular the category of play analysis is lowered for the intervention group by only one score (subject L), the other subjects all

scoring high on self perception. Subjects B and G are consistently high on all measures whereas subject F scores low on creativity, control and frustration, subject L had low scores on only creativity and control and subject A had a low score only on control.

ORDINAL SCALES OF PSYCHOLOGICAL DEVELOPMENT:

(vid. APPENDIX F)

Reliability:

As has been mentioned in Chapter V, the administration of this test proved difficult in terms of locating suitably qualified testers. As three psychologists were involved in the administration of the scales it was possible to check across those infants who were tested by two separate psychologists at different times. (vid. Chapter V, page 235)

Tester I	Administered scale to subjects A, B and C. (Did not continue further)
Tester II	Repeated scale to subjects A, B and C and continued with subjects E, F, G and I. (Did not continue further)
Tester III	Repeated scale to subject I and continued with subjects J, K, L, M, 1, 3, 6 and 7.

The infants were approximately 2.6 years of age when tested by Testers I and III. It was not possible to make this an exact date for all children due to cancellations of testing sessions because of child illness or family illness.

Agreement was reached between Testers I and II and between Testers II and III on administration and scoring of the six scales across the children tested in common and as each person was an experienced psychological tester their agreement was taken as a satisfactory condition for assessment to proceed. Because Testers I and II discontinued their tasks suddenly, it was not possible to arrange for inter-observer reliability checks to take place, therefore no comparisons of their ratings are available (vid. Chapter 5 page 236).

Analysis of the Scales

Table 6:16 lists the ages at which both groups of children were assessed on the Uzgiris and Hunt scales.

The total scores obtained by both the intervention and contrast groups on five of the ordinal scales of the Uzgiris and Hunt are set out in Table 6:16. The scores obtained on the individual items making up these total scale scores are set out in Tables 6:17, 6:19, 6:20, 6:22, 6:23. The total scores obtained by each individual child on each scale are set out in Table 6:21.

Scale I: (Development of Visual Pursuit and Permanence of Objects)

TABLE 6 :16

AGES AT TESTING ON THE UZGIRIS AND HUNT SCALES

INTERVENTION GROUP		CONTRAST GROUP	
Range	29-33 months	Range	26-35 months
Mean	30.72 months	Mean	30 months
A	32 months	1	35 months
B	32 months	2	31 months
C	33 months	6	28 months
E	31 months	7	26 months
F	30 months		
G	29 months		
I	32 months		
J	29 months		
K	29 months		
L	31 months		
M	30 months		

Scale I is concerned with the development of visual pursuit and the development of the concept of the permanence of objects. It comprises 15 steps, each of which has a "critical" action which is scored as the highest level of cognitive functioning. For the purposes of the study 12 steps were used for analysis of the data (vid. Chapter V, page 237) because no child in either group sustained interest after step 12.

It can be seen from Table 6:18 that the total scores obtained by the two groups on Scale I were relatively similar. The difference between the average scores was clearly not statistically significant. However, an inspection of the individual items making up this scale revealed some interesting differences (Table 6:17).

On item 2 all the contrast group score two whereas six of the intervention group score three or four. Again in item 8 it is evident that all the contrast group score five (except one) while five of the intervention group score three or less.

Items 10, 11 and 12 measure a higher stage in the development of the concept of the object. The child is required to search even though the object has been moved without the child being able to see it ("invisible displacement"). The results of these three items form a pattern. All except two of the intervention group score well

TABLE 6 : 17

ORDINAL SCALES OF PSYCHOLOGICAL DEVELOPMENT

Comparisons of Groups : Scale I

SCALE I	Intervention Group (N = 11)			Contrast Group (N = 4)			
Item	Mean	S.D.	Range	Mean	S.D.	Range	T VALUE
1	3.00	0.00	3	3.00	0.00	3	0.00
2	2.90	0.94	2-4	2.00	0.00	2	1.88
3	2.00	0.00	2	2.00	0.00	2	0.00
4	2.81	0.40	2-3	3.00	0.00	3	-0.88
5	1.81	0.60	0-2	2.00	0.00	2	-0.59
6	1.81	0.60	0-2	2.00	0.00	2	-0.59
7	1.81	0.60	0-2	2.00	0.00	2	-0.59
8	3.36	1.96	0-5	4.75	0.50	4-5	-1.37
9	1.90	0.30	1-2	2.00	0.00	2	-0.59
10	2.36	1.20	0-3	1.25	1.89	0-4	1.37
11	0.45	0.68	0-2	0.50	1.00	0-2	-0.10
12	1.18	0.87	0-2	0.00	0.00	0	

TABLE 6 : 18

ORDINAL SCALES OF PSYCHOLOGICAL DEVELOPMENT

Comparison of Groups

	Intervention Group (N = 11)			Contrast Group (N = 4)			
	Mean	S.D.	Range	Mean	S.D.	Range	T VALUE
SCALE I The development of visual pursuit and the permanence of objects	25.26	3.74	18-30	24.50	2.38	23-28	0.42
SCALE II The development of means for obtaining desired environmental events	30.90	7.34	19-39	26.75	8.38	18-38	0.94
SCALE III The development of imitation, vocal and gestural							
(a) Vocal imitation	13.81	5.47	3-21	3.75	1.25	2-5	3.56*
(b) Gestural imitation	12.18	5.68	1-17	3.75	2.36	2-17	2.82*
SCALE IV The development of operational causality	18.72	2.41	14-22	16.75	2.87	13-20	1.34
SCALE V The construction of object relations in space	23.90	1.86	20-27	21.55	2.98	18-25	2.09*

* $p = < .05$

on item 10, and all except three score on item 12. However, in the contrast group, only two score on item 10 and none score on item 12. Thus, most of the children in the contrast group do not seem able to retain the concept of the object when it is displaced visibly, while most of the intervention group have achieved this level. The exception in the intervention group is subject J who was known to have auditory problems.

Item 12 (Finding an object following one invisible displacement with two screens alternated) was not attempted by any of the four children in the contrast group.

It could be said that, although the two groups show equal ability in the earlier skills of visual pursuit of moving objects, there is a difference in their level of development of concept of the object. The possible total for this scale is 33 points and it can be seen from the Table 6:21 that two of the intervention children obtained a score of 30 points.

Scale II: (Means for Obtaining Desired Environmental Events)

The results reported in Table 6:18 indicate that the difference between the total scores obtained by the two groups on this scale was not significant. Again, however, examination on individual items reveals some interesting patterns (vid. Table 6:19).

TABLE 6 : 19

ORDINAL SCALES OF PSYCHOLOGICAL DEVELOPMENT

Comparisons of Groups : Scale II

SCALE II	Intervention Group (N = 11)			Contrast Group (N = 4)			
	Mean	S.D.	Range	Mean	S.D.	Range	T VALUE
Item							
1	0.45	0.52	0-1	0.75	0.50	0-1	-0.98
2	2.90	0.30	2-3	3.00	0.00	2-4	-0.59
3	3.00	0.00	3	2.75	0.95	2-4	0.93
4	3.00	0.00	3	3.00	0.00	3	0
5	2.00	0.00	2	2.00	0.00	2	0
6	3.18	1.77	1-5	3.25	2.06	1-5	-0.06
7	1.54	1.36	0-3	1.75	1.25	0-3	-0.26
8	3.00	1.41	0-4	2.50	1.29	1-4	0.62
9	4.63	1.80	0-6	3.75	2.21	1-6	0.80
10	2.54	1.57	1-5	1.75	1.50	1-4	0.88
11	2.18	1.60	0-4	0.75	0.95	0-2	1.66
12	2.45	1.03	0-3	1.50	1.73	0-3	1.33

Items 11 (Foresight in the problem of the necklace and container) and 12 (Foresight in the problem of the solid ring) were attempted by only two of the four children in the contrast group, whereas nine out of eleven and ten out of eleven children respectively attempted the task in the intervention sample. Although no child in either group achieved the critical action in item 11, four children in the intervention sample attained a score of 4, indicating that they had achieved a successful end after a trial, whereas none of the contrast sample attained this level of schema development. Once again the infant who did least well on this scale was subject J.

Scale III (a): (Development of Vocal Imitation)

The results reported in Table 6:18 indicate that there was a statistically significant difference between the two groups in the development of vocal imitation. Reference to Table 6:20 shows that the difference was mainly due to item 2 (response to familiar vocalisations) and item 4 (imitation of familiar words).

Item 3 (response to familiar sound patterns) and item 6 (imitation of unfamiliar sound patterns) also showed substantial differences, although these were not statistically significant for the size of the groups involved.

Appendix F shows that, although all but one child (subject E) scored for vocalisation in item 1 of the scale,

TABLE 6 : 20

ORDINAL SCALES OF PSYCHOLOGICAL DEVELOPMENT

COMPARISON OF GROUPS : SCALE III

	SCALE III	Intervention Group (N = 11)			Contrast Group (N = 4)			
		Mean	S.D.	Range	Mean	S.D.	Range	T VALUE
(a)	Development of Imitation - Vocal							
	1	1.81	0.60	0-2	2.00	0.00	2	-1.00
	2	2.63	1.43	1-5	0.25	0.50	0-1	3.19*
	3	2.54	2.06	0-5	0.25	0.50	0-1	2.15
	4	2.27	1.10	0-3	0.75	0.50	0-1	2.61*
	5	1.63	1.62	0-4	0.00	0.00	0	1.96
	6	2.90	2.25	0-5	0.50	0.57	0-1	2.06
(b)	Development of Imitation - Gestural							
	1	2.45	0.93	1-3	1.50	0.87	1-3	1.64
	2	3.36	2.15	0-5	2.00	2.00	1-5	1.10
	3	3.00	1.34	0-4	0.50	0.57	0-4	3.54*
	4	3.36	2.20	0-5	0.25	0.50	0-5	2.74*

* $p = < .05$

the quantity and quality of response vocalisations differed very markedly between the two groups. Item 2 (response to familiar vocalisations) and item 3 (response to familiar sound patterns) revealed that no child in the contrast group was making any vocalisation at all. Only one member of the intervention group (subject J) had a lower score than the highest in the contrast group. Subject B who had the second lowest score in the intervention group was also known to have auditory loss due to middle ear effusion.

It can also be seen from the individual scores reported in Appendix F that five of the eleven children in the intervention group reached the critical level for the imitation of new words whereas none of the contrast group exhibited any vocalisation or speech patterns. The possible total for this scale was 24 points and it can be seen from Table 6:21 that five out of eleven children scored 16 or above for this scale whereas only two children in the contrast group scored 1 point, the remaining two not registering any score at all.

Scale III (b): (Gestural Imitation)

As with the total scores for vocal imitation, the total scores for gestural imitation showed a statistically significant difference between the two groups (Table 6:18).

On individual items of the scale (Table 6:20) there is a marked contrast between the two groups on item 3 (imitation of unfamiliar gestures, visible) and item 4 (imitation of unfamiliar gestures, invisible).

TABLE 6 : 21

TOTAL SCORES ON SCALES I-V

ORDINAL SCALES OF PSYCHOLOGICAL DEVELOPMENT

Comparison of Groups

	Scale I	Scale II	Scale III (a)	(b)	Scale IV	Scale V
Intervention Subjects (N = 11)						
A	28	38	16	5	20	25
B	30	39	7	11	22	22
C	28	26	10	17	16	25
E	26	30	13	6	21	24
F	26	35	19	17	20	23
G	22	23	14	16	19	23
I	30	38	21	17	20	25
J	18	17	3	1	14	20
K	26	30	17	13	19	25
L	23	26	13	15	19	24
M	22	38	19	16	16	27

TABLE 6 : 21 (continued)

TOTAL SCORES ON SCALES I-V

ORDINAL SCALES OF PSYCHOLOGICAL DEVELOPMENT

Comparison of Groups

	Scale I	Scale II	Scale III	(a)	(b)	Scale IV	Scale V
Contrast Subjects (N = 4)							
1	28	38		4	7	20	25
3	23	27		4	2	13	20
6	24	24		5	17	17	22
7	23	18		2	4	17	18
POSSIBLE TOTALS:	33	44		24	17	29	28

Item 3 (Imitation of unfamiliar gestures visible to the infant) indicates a significant difference between the means of the two groups also (t = 3.54). As can be seen from Table 6:18 the mean for this item for the intervention group was 3.00 with a standard deviation of 1.34 whereas for the contrast group the mean was 0.50 with a higher standard deviation of 0.57. Appendix F shows that only one of the children in the contrast group scored at the level of critical action (4 points) whilst the other three scored 0 or 1 point. Of the intervention group only two children scored below 3 points, one of those infants being Subject J.

Item 4 (Imitation of unfamiliar gestures invisible to the infant) was also found to be statistically significant when the difference between the means was calculated (t = 2.74). The intervention group had a mean of 3.36 with a standard deviation of 2.20 whereas the contrast group had a much lower mean of 0.25 with a standard deviation of 0.50. Again it can be seen from Appendix F that only one child in the contrast group reached a critical action in this scale (the others scoring 1 or less) whereas only two children out of eleven in the intervention sample failed to score. Once again one of these children was Subject J.

It could be said that, on the results of this scale, there is a marked difference between the two groups in their ability to imitate gesturally unfamiliar actions. The contrast group can be seen to be markedly disadvantaged in this pre-language skill.

When the total score for this scale (possible total 17) is considered, it is evident that only three children in the intervention sample have scores less than 10, but three out of four of the contrast group have scores of less than 10 (vid. Table 6:21).

Scale IV: (The Development of Operational Causality)

It can be seen from Table 6:18 that the total scores for Scale IV (the development of the concept of operational causality) were relatively similar for the two groups.

The results of individual items on this scale reported in Table 6:22 indicate that there was only one of the seven items on which the intervention group showed a marked difference from the contrast group. This was on item 5 (behaviour to a spectacle created by an agent). The children in the intervention sample scored consistently higher on this item, in all but one case reaching a critical action whereas none of the contrast group children reached this level. (vid. Appendix F). Items 1, 2 3, 4, 6 and 7 show very little variation in the means, standard deviations or range. In all cases a majority of children in both groups reached a critical level of action.

It is interesting to note that in item 5, where infants are required to respond to new spectacles created by the tester, for example facial grimacing, finger drumming etc.,

TABLE 6 : 22

ORDINAL SCALES OF PSYCHOLOGICAL DEVELOPMENT

Comparison of Groups : Scale IV

SCALE IV	Intervention Group (N = 11)			Contrast Group (N = 4)			
	Mean	S.D.	Range	Mean	S.D.	Range	T VALUE
1	0.45	0.52	0-1	0.75	0.50	0-1	-0.98
2	3.00	0.00	3	3.25	0.50	3-4	-1.78
3	3.00	0.00	3	2.75	0.50	2-3	1.78
4	1.90	1.13	1-3	2.00	0.00	2	-0.16
5	2.90	0.70	1-4	1.00	0.81	0-2	4.49*
6	3.18	1.60	1-5	3.50	1.73	2-5	-0.33
7	4.27	1.73	1-6	3.50	1.73	2-5	0.76

* $p = < .05$

the intervention sample were considerably more responsive; whereas on the other items which involved the use of a toy or familiar game to attract a response there appeared to be no noticeable difference between the groups. It could be said that the intervention infants had a higher level of response to interesting but unfamiliar actions made by another human being than did the contrast group. It is interesting to note this difference with regard to the observed diffences between the groups on the preceding pre-language gestural and imitation scales. It might be suggested that lack of response on item 5 of Scale IV reflects an immature level of communicative response evident in Scales 3(a) and (b) by the contrast group.

Scale V: (The Construction of Object Relations in Space)

As can be seen from Table 6:18 Scale V (the construction of object relations in space) is the second of the five developmental scales to show a statistically significant difference between the two groups of D.S. children. While the difference between the average scores is not large (23.90 and 21.25), the range of scores obtained is relatively small. One of the children in the contrast group did relatively well (Child 7, Score 25) but the other three had scores which fell at the bottom of the range of scores obtained by the intervention sample (vid. Table 6:21).

Only one item on this scale showed a marked difference between the two groups. This was item 8 (Appreciating Gravity in Play with Objects). Items 1, 2, 3, 4 and 5 show very little if any variation between the two groups. The means and standard deviations scores indicate this similarity. Item 6 (Using the Relationship of the Container and the Contained) shows a slight variation in range where two out of four children in the contrast group did not attempt to put any objects in the container whereas all children in the intervention sample attempted an action indicating an observed relationship between the object and the container (vid. Appendix F). The same pattern is true of item 7 (Placing Objects in Equilibrium One upon Another) where two out of four children in the contrast group did not attempt any action and only one of the 11 intervention children performed similarly.

Item 8 (Appreciating Gravity in Play with Objects) shows a marked variation between the two groups reflected in the means and standard deviations (Table 6:23). From Appendix F it can be seen that three out of four children in the contrast group did not attempt any action at all whereas only two out of eleven (including again Subject J) did not attempt any action for this item.

Item 9 (Exploring the fall of a dropped object) shows three out of the four children in the contrast group as scoring 1 or less, whereas only three out of eleven children in the intervention sample scored less than 2 points on this item (vid. Appendix F).

TABLE 6 : 23

ORDINAL SCALES OF PSYCHOLOGICAL DEVELOPMENT

COMPARISON OF GROUPS : SCALE V

SCALE V	Intervention Group (N = 11)			Contrast Group (N = 4)			
	Mean	S.D.	Range	Mean	S.D.	Range	T VALUE
1	1.72	0.46	1-2	1.50	0.57	1-2	0.79
2	3.00	0.00	3	3.00	0.00	3	0.00
3	4.00	0.00	4	4.00	0.00	4	0.00
4	3.45	0.93	2-4	2.50	1.00	2-4	1.72
5	1.81	0.60	0-2	2.00	0.00	2	-0.59
6	2.72	0.46	2-3	2.00	1.15	1-3	1.81
7	1.81	0.60	0-2	1.00	1.15	0-2	1.83
8	1.36	0.80	0-2	0.25	0.50	0-1	2.55*
9	1.45	0.93	0-2	1.00	0.81	0-2	0.86
10	1.81	0.60	0-2	2.00	0.00	2	-0.59
11	0.90	1.04	0-2	2.00	0.00	2	-2.04

* $p = < .05$

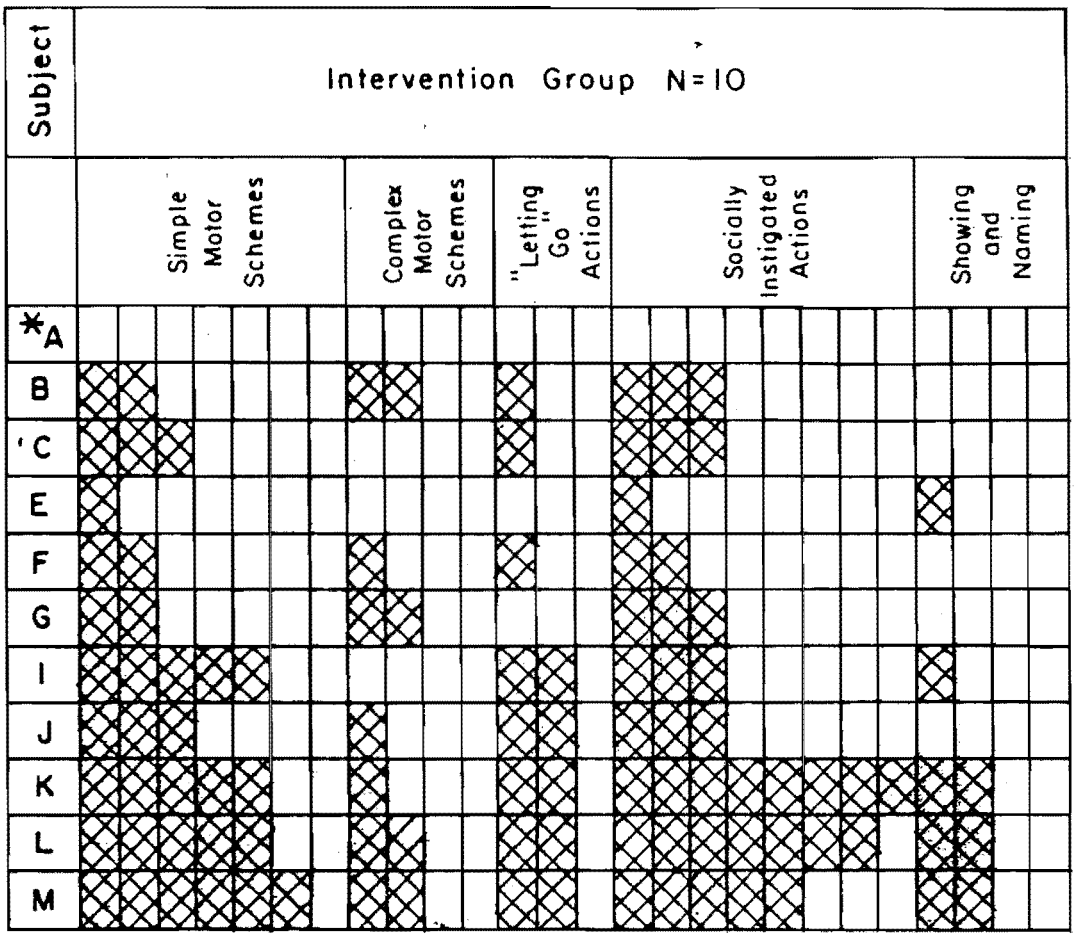
In summary it could be said that the intervention sample showed a greater maturity in their appreciation of object relations in space than did the contrast group. This result would support the findings of Scale I in terms of object permanence where a similar level of maturity was found with the intervention subjects.

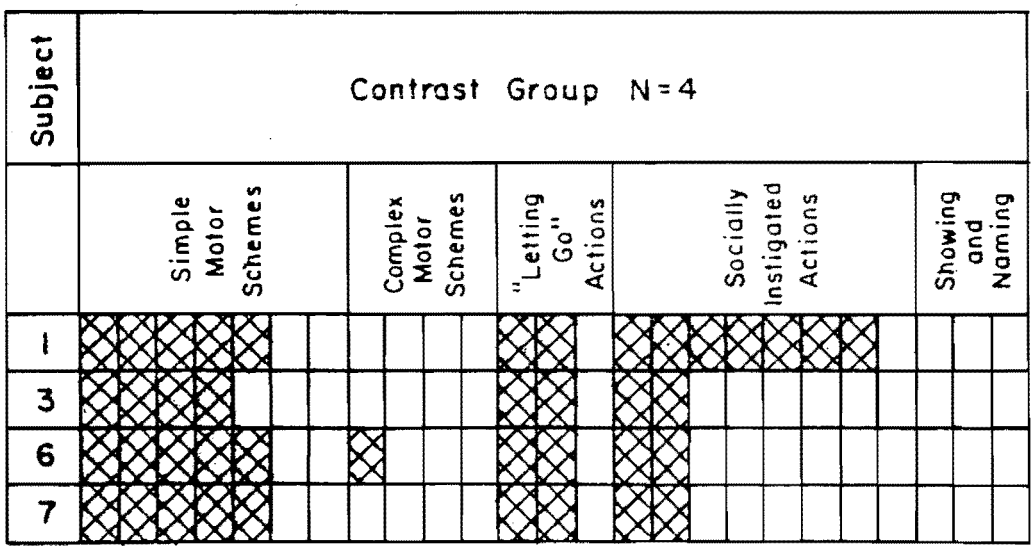
Scale VI: (The Development of schemas for relating to objects).

Figure 6:II represents the repertoire of sensorimotor schemas used by the children when presented with a selection of objects, either singly or in conjunction with another object. The objects presented lend themselves to the manifestation of particular types of schemas. For example, objects which lend themselves to actions with social meaning include a cup, a doll's shoe and a necklace. The shaded areas in the figure depict the number of schemas elicited by a specified number of presentations. For example, subject B elicited two simple motor schemas out of seven presentations of objects by the tester. As can be seen from the figure, subject (A) did not score at all. As he had fallen asleep by the end of Scale V there was no point in continuing the assessment.

All children (except Child A) demonstrated between one and six schemas relating to acting on simple objects. The median number of these simple motor schemas was three for the intervention group and four for the contrast group. Complex

FIGURE 6:II





* Subject A did not complete test due to fatigue and therefore did not attempt this section

Ordinal Scales of Psychological Development

Scale 6 : Comparison of Groups

motor schemas were less frequently observed. Only one child (subject 6) in the contrast group had any at all, whilst in the intervention group seven out of ten infants exhibit one or two of these behaviours. Letting go actions are observed in both groups, although two out of ten children in the intervention sample did not exhibit releasing actions. Socially instigated actions are again observed in both groups. Subject (1) in the contrast group demonstrated seven of these behaviours whilst the other three subjects scored only 2 points for this section. The intervention group children ranged from 1 to 8. Showing and naming schemas were less frequently observed in the intervention group and were not apparent at all in the contrast group; a situation which can be predicted from the results of scales 3(a) and 3(b) for the contrast group.

In general figure 6:II would suggest that, although the intervention group showed a smaller number of "simple motor" and "letting go" schemas, they exhibited a greater total number and a greater range of schemas. The median number of different types of schemas observed in the intervention sample was four, while the median number for the contrast group was three out of the five different types of schemas. Subjects K, L and M can be seen to have had a consistent performance across all eliciting situations. This is not apparent in the performance of any of the contrast group children.

RELATIONSHIPS BETWEEN VARIABLES OPERATING WITHIN THE INTERVENTION SAMPLE

The last three sections have been concerned with the comparison of the intervention group with the contrast group on measures of parent behaviour (The H.O.M.E. and the ABC scale) and attitude (P.A.A.T.) and an assessment of cognitive development (Uzgiris & Hunt scales). These comparisons have pointed up a number of areas in which the intervention programme appears to have had an effect on the development of the children in the intervention sample which was not evident in the children in the contrast sample.

However, there are two major difficulties involved in drawing definite conclusions from these comparisons. First, for reasons beyond the control of the researcher, the contrast group is relatively small. This means that a small or accidental change in the life of one child can have a significant effect on the average for the group and consequently on the conclusion that can be drawn from a sample comparison between the averages of the two groups.

While it should be noted that the total population of D.S. children is also quite small and that generalising from a small sample to a small population is not nearly as hazardous as it would be with a population of normal children, never the less common sense indicates that comparisons with the contrast group must be treated with reasonable caution.

SEE ERRATA

The second major difficulty involved in drawing conclusions about the effects of the intervention programme from comparisons with the contrast group is that it tends to imply that the intervention programme was a static and simple treatment applied uniformly to all of the children in the intervention sample. In fact, as previous sections have indicated, it was both theoretically and practically a complex and sensitive intervention in living and developing families.

The programme varied from family to family and involved communication between the participating adults, monitoring of progress and constant decisions about the form and content of the activities. As such it must be seen as a dynamic programme involving the interaction of several microsystems.

The best way to view it is not as a single intervention programme but as a set of eleven individual programmes showing some elements in common and having many elements that were uniquely determined by the individual characteristics of the children and their families.

This being so, it becomes important to consider how the eleven individual programmes varied from each other and if any of them were more effective than others. This leads to a search for the reasons lying behind these differences. For example, was the programme affected by the extent of the abnormalities exhibited by the child? Was it more effective in homes with a higher level of income or where the mothers felt better able to be patient with their children? Did the presence of other siblings have any effect?

Any thorough evaluation of an intervention programme of this kind must be concerned not only with its overall effect but also with the way in which the effect was achieved. The data analysis reported in the following section is concerned with this question: How did the programme work for the individual children and how did it interact with conditions and people involved?

THE EFFECT OF DEGREE OF ABNORMALITY

It was possible that the way the programme worked was related in some way to the extent of physical abnormalities present in the children. Those with more extensive physical problems may have been more difficult to handle, requiring more patience or persistence on the part of the parents.

An assessment was made of the extent of physical abnormalities (e.g. vision, hearing, cardiac defect) in each child. Those with a recognised problem were given a score of 1 and those with no evident abnormalities scored 0. Table 6:24 reports the correlation (Pearson-Product Moment) between this measure and the other assessments made on the children and their caregivers.

(a) Relationships to Caregiver Behaviour and Attitudes

The pattern of correlation reported in Table 6:24 suggests that the presence of a physical abnormality had little detectable effect on the measure of parent behaviour

TABLE 6 : 24

THE CORRELATION OF PHYSICAL ABNORMALITY WITH OTHER MEASURES

		Correlation with Physical Abnormality
ABC Scales:		
Scale 1 :	Language Facilitation	-.29
2 :	Social-Emotional	.17
3 :	Piaget tasks	.37
PAAT Scales:		
Scale 1 :	Creativity	.44*
2 :	Control	.62**
3 :	Play	.67**
4 :	Teaching/Learning	.58**
5 :	Frustration	.52**
Uzgiris Hunt:		
Scale I :	Object Permanence	-.14
II :	Means/Ends	-.20
III(a) :	Language (Vocal)	-.42*
III(b) :	Language (Gesture)	-.50*
IV :	Causality	.03
V :	Objects in Space	-.47*

TABLE 6 : 24 (continued)

THE CORRELATION OF PHYSICAL ABNORMALITY WITH OTHER MEASURES

Developmental Skills:	Correlation with Physical Abnormality
Sits alone	-.02
Crawls	-.46*
Walks alone	-.24
Looks for dropped object	.31
Pincer grasp	-.06
Take/release	-.02
Babbling	.00
Smiling responsively	-.01
Laughing	.05
Fathers' Socioeconomic Status	-.10
Family Size	-.41*

* $p = < .10$

** $p = < .05$

(the ABC scale) but a marked effect on the mother's feelings about herself as a caregiver (the P.A.A.T scales). The following table (Table 6:25) indicates the direction of this relationship for one of the P.A.A.T. scales (the Play scale) showing the largest correlation.

It can be seen from Table 6:25 that those mothers whose children had a physical abnormality had a significantly higher score on the Play scale, indicating that they understood the importance of play as a source of learning.

The same differences were apparent on the other PAAT scales suggesting that in general the parents of children with physical abnormalities were more likely to feel less confident caregivers. It is interesting to note that although there was an effect of the presence of a physical abnormality on the mother's feelings about her adequacy as a caregiver and teacher, there were no differences apparent to an observer in her actual behaviour.

It is pertinent to speculate on the reason why this relationship was apparent, and what effects it might have had on the children. To the extent that the children were affected by the observed behaviour of the mother, there was no discernible relationship between abnormality and behaviour. However, if the mother's feelings were having an effect which was different from the effect of her behaviour (as it was observed during the scoring of the ABC scales) then the

TABLE 6 : 25

RELATIONSHIP OF PHYSICAL ABNORMALITY TO SCORE ON THE PLAY SCALE OF THE P.A.A.T.

	Score on Play Scale		
	N	Mean	s.d.
Physical abnormality present	5	37.2	1.7
Physical abnormality not present	6	32.0	3.5

presence of a physical abnormality was of considerable significance. Closer examination of the relationships of these scales to developmental patterns and cognitive skills later in this section does help to clarify this issue.

(b) Relationships to Cognitive Development

The results reported in Table 6:24 indicate that there is a relationship between the presence of a physical abnormality and some areas of cognitive development. The relationship is most marked for the two language scales (Scales IIIA and IIIB) and for the scale assessing the child's ability to perceive the construction of object relations in space (Scale V).

Table 6:26 provides a clearer picture of the direction of this relationship. Here it is apparent that children with physical abnormalities have not progressed as well in both aspects of language (Scale IIIA (Vocal) and Scale IIIB, (Gesture)) and have not progressed as well in their ability to localise objects in space or to perceive spatial relationships. One child in particular (child J) showed very little progress at all in these areas. Subject J suffered from chronic otitis media with significant hearing loss and was also the youngest child assessed in the intervention sample. However the other two subjects scoring low on the language scale (subjects A and B) also had recurrent hearing loss, and it is possible that this problem affected their scores on the Uzgiris & Hunt language scales, although removing Subject J from the sample still leaves a marked difference between the two groups.

TABLE 6 : 26

RELATIONSHIP OF PHYSICAL ABNORMALITY TO COGNITIVE DEVELOPMENT

		SCALE IIIA		SCALE IIIB		SCALE V	
	N	Mean	s.d.	Mean	s.d.	Mean	s.d.
Physical abnormality present	5	11.4	5.5	9.2	5.5	23.0	1.9
Physical abnormality not present	6	15.8	4.0	14.7	3.9	24.7	1.2

(c) Relationships to the Age of Achieving Developmental Skills

The correlations reported in Table 6:24 suggest that the presence of a physical abnormality had very little effect on the age at which these children achieved the major developmental skills. There is one significant negative correlation suggesting that children with a physical abnormality were crawling sooner (47.6 weeks compared with 64.7 weeks) than the children with no physical abnormality. However, this difference is very largely created by two particular children (Child C and Child L) who were observed to crawl 20 or more weeks later than all the other children. (Subjects C and L evidenced very reduced muscle tone).

Apart from this difference, it seemed that the intervention programme of exercises and activities worked equally well for the children with and without a physical disability.

(d) Summary of the Effects of Physical Abnormality

The data presented in this section indicate that the presence of additional physical abnormalities seems to have had an effect on the attitude of the caregivers (P.A.A.T.) but not their observed behaviour (ABC scales); an effect on language development and concepts of objects in space (Uzgiris & Hunt Scales III and V) but not on the ages at which they achieved most of the major developmental skills.

This may mean that children with physical abnormalities are felt by parents to present more of a problem so that they feel more frustrated and experience more insecurity and reduced confidence in their perceptions of themselves as caregivers and teachers of their handicapped children. However, the parents did manage with the support of the programme to compensate for the extra difficulties so that their observed behaviour was not distinguishable from the behaviour of parents with children with no physical disabilities. It could be suggested that it is in this area that the programme is having its greatest effect, providing the extra support needed by the parents.

However, there is one area where the presence of a physical disability has a significant effect. The two Uzgiris & Hunt scales which deal with language show a significant delay. The language facilitation scale of the ABC shows a slight negative effect. However, the age of onset of babbling does not seem to have been affected. It could be suggested that the reason for this was that the onset of babbling (approx 6-8 months) occurred before the onset of recurrent ear infection and resultant hearing loss.

By two and a half years of age when assessment on the language scales occurred significant or fluctuating hearing loss was an established pattern for some children.

It was noticed by the researcher that auditory problems in the D.S. children resulted in reduced levels of functioning in all areas of development during the period prior to treatment. They were observed to regress in physical and cognitive skills as well as in those areas specifically related to language development.

THE EFFECT OF SOCIOECONOMIC STATUS

One of the possibilities in a programme of this kind is that the effects which appear to be due to the programme are in fact largely due to the educational and income levels of the parents. Whether the effect is due to genetically determined abilities, or the product of the additional environmental stimulation and social and medical support services which tend to go with higher income families, need not concern us here. For whatever reason, measures of socioeconomic status have been found to be moderately correlated with the effects of many different educational and social intervention programmes.

While the earlier analysis had indicated that socioeconomic status is not an alternative explanation for the differences between the intervention and contrast groups, it is still possible that differences in the effectiveness of the programme within the intervention group might be related to the type of family background difference. For example, it might be expected that parents with higher levels of education and income might have been better able to understand the purposes of the programme and better able to provide additional support and materials.

Table 6:27 sets out the correlations between the measure of socioeconomic status (based on father's occupation) and the other measures.

(a) Relationships to Caregiver Behaviour and Attitudes

The general pattern of correlations between socioeconomic status and caregiver behaviour and attitudes is primarily negative. Since the scale of socioeconomic status used (Elley & Irving 1976) gives the lowest score to the highest status, these negative correlations mean that those parents (mothers) in the higher level occupations tend to score higher on these caregiver scales.

The three measures of observed behaviour, however, show no significant correlations with socioeconomic status, indicating that there is no reliable difference in observed behaviour between families of different occupational levels. It is the measures which describe the caregivers' perception of their own behaviour (P.A.A.T. scales) which show a reliable relationship to socioeconomic status. Table 6:28 below sets out the nature of this relationship for the two scales that show the strongest correlations.

It is clear that the mothers whose husbands' occupations are classified in the top three levels of the Elley & Irving scale have higher scores on the frustration scale and on the control scale than do mothers whose husbands

TABLE 6 : 27

THE CORRELATION OF SOCIOECONOMIC STATUS WITH OTHER MEASURES

		Correlation with Socioeconomic Status
ABC Scales:		
Scale 1 :	Language Facilitation	-.13
2 :	Social-Emotional	-.37
3 :	Piaget tasks	-.24
PAAT Scales:		
Scale 1 :	Creativity	-.47*
2 :	Control	-.52**
3 :	Play	-.13
4 :	Teaching/Learning	-.40
5 :	Frustration	-.55**
Uzgiris Hunt:		
Scale I :	Object Permanence	-.23
II :	Means/Ends	.13
III(a) :	Language (Vocal)	.59**
III(b) :	Language (Gesture)	.01
IV :	Causality	-.32
V :	Objects in Space	-.41*

TABLE 6 : 27 (continued)

THE CORRELATION OF SOCIOECONOMIC STATUS WITH OTHER MEASURES

	Correlation with Socioeconomic Status
Developmental Skills:	
Sits alone	-.65**
Crawls	-.32
Walks alone	-.14
Looks for dropped object	.29
Pincer grasp	.19
Take/release	.11
Babbling	-.17
Smiling responsively	.26
Laughing	.33
Family Size	.12

* p = < .10

** p = < .05

TABLE 6 : 28

RELATIONSHIP OF SOCIOECONOMIC STATUS TO P.A.A.T. FRUSTRATION AND CONTROL SCALES

		P.A.A.T.			
		Frustration		Control	
Socioeconomic Status	N	Mean	S.D.	Mean	S.D.
Upper levels (1, 2, 3)	5	31.2	3.4	27.6	2.6
Lower levels (4, 5)	6	28.5	1.7	26.3	1.6

have occupations classified as lower in the scale (e.g. skilled and semiskilled). This means that the mothers' perceptions of their ability to tolerate frustration tend to be more in keeping with developmental needs. It is suggested by Strom (1978) that when parent expectations are consistent with developmental needs, the tendency is to encourage normative behaviour and a favourable self-concept and these do relate to the differences in education and income which go with socioeconomic status. Similarly the "control" scores of mothers whose husbands are in the top three levels of the Elley & Irving scales reflect the tendency of these mothers to be more willing to share dominance, decision-making and uncertainty, as well as to allow disagreement, spontaneity and privacy (Strom, 1978).

(b) Relationship to measures of cognitive development

Two of the Uzgiris & Hunt Scales showed significant relationships with socioeconomic status and four did not (vid. Table 6:27).

The two scales which did show a significant correlation with socioeconomic status present an interesting pattern. It was noted earlier (vid. table 6:27) that on both Scale III (a) (Vocal Imitation) and Scale V (Object Relations in Space) there were significant differences between the intervention and the contrast groups. The intervention programme seems to have had a marked effect on these skills.

However, it is possible that a significant part of the effect on these two types of skills may have been due to the nature of the home background. Table 6:29 sets out the data relevant to this hypothesis.

Two things are notable in Table 6:29. The first is that the children from families classified as of lower socioeconomic status do better on these two scales than children classified as coming from families of higher socioeconomic status. Secondly, the dispersion of scores (the standard deviation) for children coming from lower socioeconomic homes is much greater. Their scores are both the lowest and the highest although they score on average higher than those children of parents with higher incomes and levels of education. Why this might be so is difficult to determine but it is quite clear that within the intervention programme, higher socioeconomic home background is not having the strong positive effect that might be expected. Presumably other factors not normally associated with socioeconomic status are playing a more significant role.

It is possible that the high scoring children (I, K and M) reflect the effects of particular mothers who were intelligent, interested and totally committed to the benefits of the intervention programme although they come from lower SES homes. It is also possible that the lower SES mothers received more time (both instructional and supportive) from the intervention staff than did mothers of higher SES backgrounds.

TABLE 6 : 29

RELATIONSHIP BETWEEN SOCIOECONOMIC STATUS AND THE VOCAL IMITATION AND OBJECT RELATIONS IN SPACE ON THE UZGIRIS & HUNT SCALES

		Vocal Imitation		Object Relations in Space	
Socioeconomic Status	N	Mean	S.D.	Mean	S.D.
Upper Levels (1, 2, 3)	5	11.4	2.6	23.6	1.0
Lower Levels (4, 5)	5	15.8	6.0	24.2	2.2

(c) Relationship to Age of Achievement of Developmental Skills

There appears to be no consistent relationship between socioeconomic status and the age at which the children achieved the major developmental skills. If any pattern is discernible it may be that the gross motor skills developed earliest (sitting and crawling) tended to occur at a younger age in the lower socioeconomic families, while the social and fine motor skills tended to occur at an earlier age in the families of higher socioeconomic status. One reason for the latter relationship may have been the effect of the size of families, a point which is examined more closely in the next section.

However, there is one developmental skill which was significantly related to socioeconomic status. Sitting alone occurred on average at 35.6 weeks in the five families classified at higher socioeconomic status, while it occurred at 26.7 weeks in the families classified as lower socioeconomic status. Again, this effect is contrary to what one might expect if higher socioeconomic status was positively related to faster development. A possible explanation relates to factors which the children themselves present and which were largely beyond the control of the intervention programme. Those infants at the bottom of the range in the intervention sample took somewhat longer than other infants to attain the necessary strength in the muscles of the neck, shoulder girdle and trunk to master the skill of independent sitting. It

would appear to be a chance factor that four of the children initially disadvantaged with this problem were from the high SES families. Three of these infants exhibited markedly reduced muscle tone during the first year of life (Subjects C, E and L); Subject G resided in Karitane Hospital for the first six months of her life, a factor which may have contributed to a delay in early developmental skills. Although there is no objective measure of muscle tone in infants there is a range within the D.S. population (the top end of which is still subjectively classified as abnormal).

(d) Summary of the effects of socioeconomic status

There appeared to be only one area in which socioeconomic status was consistently related to the measures obtained in this study. Parents' perceptions of their behaviour as caregivers (as measured on the P.A.A.T. scales) were correlated with the socioeconomic status of the father's occupation. Mothers from higher status families (where the level of education and income is higher) tend to see themselves as more tolerant and better able to share power and dominance.

However, when the effects of socioeconomic status on developmental and cognitive skills were examined, there was no evidence to suggest that the children from the more advantaged homes were benefiting from the intervention programme more than children from less advantaged homes. On some measures

(vocal imitation, object relations in space, sitting alone) there was in fact a negative relationship with socioeconomic status. Detailed examination of the data suggested, however, that other factors such as muscle tone and parental commitment to the programme may have been the dominant factors underlying these relationships.

THE EFFECT OF FAMILY SIZE

If the family is seen as a microsystem within which the D.S. child develops, then one of the important dimensions of that microsystem is the number of children with whom the D.S. child might interact. Not only will the number of children affect the time and energy that the parents might have to devote to the D.S. child, but the other children themselves may make a significant contribution to the child's development.

Just how the intervention programme might have affected the behaviour of other children in the family is not known, but it seemed important to look for any discernible effects that family size might have on the measures which were taken of the D.S. child's development and the caregiver's behaviour and self-perception.

Table 6:30 contains a listing of the correlations between family size (measured as number of siblings) and the other measures.

TABLE 6 : 30

RELATIONSHIP OF FAMILY SIZE (NUMBER OF CHILDREN) TO OTHER MEASURES

		Correlation with Family Size
ABC Scales:		
Scale 1 :	Language Facilitation	.02
2 :	Social-Emotional	-.02
3 :	Piaget tasks	-.19
PAAT Scales:		
Scale 1 :	Creativity	-.23
2 :	Control	.00
3 :	Play	.07
4 :	Teaching/Learning	.10
5 :	Frustration	-.04
Uzgiris Hunt:		
Scale I :	Object Permanence	.20
II :	Means/Ends	-.08
III(a) :	Language (Vocal)	.06
III(b) :	Language (Gesture)	-.08
IV :	Causality	.22
V :	Objects relations	.10

TABLE 6 : 30 (continued)

RELATIONSHIP OF FAMILY SIZE (NUMBER OF CHILDREN) TO OTHER MEASURES

	Correlation with Family Size
Developmental Skills:	
Sits alone	-.18
Crawls	.09
Walks alone	-.19
Looks for dropped object	.05
Pincer grasp	-.39
Take/release	.09
Babbling	-.02
Smiling responsively	.81**
Laughing	.68**
Physical Abnormalities	.41**

* p = < .10

** p = < .01

The most notable aspect of Table 6:30 is that almost all the correlations were very small indeed. None of the caregiver measures and none of the cognitive development measures were significantly related. The age of achievement of the developmental skills was not related to family size except in the case of two related skills: smiling responsively and laughing. The nature of the relationships for these two skills is set out in Table 6:30.

It is apparent from Table 6:31 that children in larger families (with three or more siblings) tended to be later to smile responsively and later to achieve the ability to laugh. There is also significantly greater variability among children of larger families in the age when these skills were first observed.

It was noted in the previous discussion of the effects of physical abnormalities that there was a relationship between the presence of abnormalities and family size. The nature of the relationship within the intervention group is set out in Table 6:32.

Although the number with physical abnormalities is relatively small, it does seem to be associated with the size of the family, possibly also with the age of the mother.

It seemed possible in the earlier discusssion of the effects of physical abnormality that some of the effects might

TABLE 6 : 31

RELATIONSHIP OF FAMILY SIZE TO AGE OF LAUGHING AND SMILING RESPONSIVELY

		Smiling Responsively*		Laughing*	
Family Size	N	Mean	S.D.	Mean	S.D.
One or two siblings	5	7.0	1.5	10.8	1.0
Three or more siblings	6	8.5	3.3	15.2	4.1

* weeks old

TABLE 6 : 32

RELATIONSHIP OF FAMILY SIZE TO PRESENCE OF PHYSICAL ABNORMALITIES

Family Size	N	Number with abnormalities	Percentage with abnormalities
One or two	5	1	20%
Three or more	6	4	66%

have been due to family size, since the two variables were closely related. However it is now clear from a comparison of Tables 6:24 and 6:30 that the two do appear to have distinctly different effects on development.

In summary, family size seems to have had a barely discernible effect on the development of the children in the intervention sample or on the behaviour of their caregivers. The only effect is a delay in smiling and laughing among children in large families. This may be due to the fact that parents with more children do not have the same amount of time to spend with the D.S. child, and consequently the child may be exposed less frequently to the face of an adult, or it may be that parents spend less time interacting in a face to face manner with each successive child.

RELATIONSHIPS OF CAREGIVER MEASURES TO DEVELOPMENTAL SKILL

The intervention programme involved working both with the mothers and with the children. The effects of the programme should have been on both the children's development (assessed through the developmental skills) and on the mother's behaviour (assessed through the ABC scales and the P.A.A.T.).

It is, however, the mothers who were primarily responsible for mediating between the programme and the children. Through a programme of guidance, teaching and

support, the intention was to alter the ways in which mothers interacted with their children. There were, however, variations in the way the mothers interpreted and adapted to the programme. Differences in family circumstances, in the characteristics of the children and other ecological factors may have been responsible for these variations.

Given the variation between the mothers and between the children within the intervention programme, it is important to try to identify those aspects of the mother's behaviour and perceptions of herself which seemed to play a critical role in the development of the child. Future programmes might place greater or lesser emphasis on behaviours shown to have greater or lesser significance.

Table 6:33 lists the correlations between scores on the two caregiver scales and the age at which the D.S. children achieved the major developmental skills. A positive correlation in that table means that a high score on the caregiver scale was associated with a high age for the developmental skill (i.e. slower development). A positive relationship between caregiver score and speed of development is indicated by a negative correlation.

(a) Relationship of Caregiver Behaviour to Developmental Skills (ABC Scale)

The pattern of correlations between the developmental skills and the scores on the ABC scales suggest that, in

TABLE 6 : 33

RELATIONSHIPS OF CAREGIVER MEASURES TO DEVELOPMENTAL SKILLS (N = 11)

Developmental Skills	A.B.C. SCALES			P.A.A.T. SCALES				
	Language Facilitation 1.	Social-Emotional (Positive) 2.	Piaget Tasks 3.	Creativity 1.	Control 2.	Play 3.	Teaching Learning 4.	Frustration 5.
1. Sits alone	05	31	28	20	36	-09	37	44*
2. Crawls	00	-02	-27	-32	-07	-80**	-22	-14
3. Walks alone	-08	65**	02	-47*	-34	-57**	-37	-44**
4. Looks for dropped object	-46*	-60**	-13	34	39	03	14	31
5. Pincer grasp	-06	-62**	-01	35	19	02	10	31
6. Take/Release	09	-01	-41*	01	07	-30	-43*	16
7. Babbling	35	65**	-33	16	-20	03	-24	26
8. Smiling responsively	11	-33	-59**	-23	-17	-22	-20	-11
9. Laughing	29	31	-32	-38	-49*	-05	-14	-15
Multiple Correlations Squared:	.65	.98	.83	.98	.99	.99	.98	.99

NOTE: A positive correlation means that a high score on the caregiver measure is related to a higher age (i.e. slower development for the developmental skill).

* $p < .10$

** $p < .05$

general, it is the second scale (social emotional positive inputs) which shows the strongest relationship to the development of physical and social skills.

Four of the correlations are statistically significant, and three more are higher than 0.30. The third scale (presentation of Piaget tasks) shows a generally lower relationship with two correlations being statistically significant and only two more above 0.30. The first scale shows the lowest relationship to the age of achieving the major developmental skills with only one correlation being statistically significant.

Those mothers with a high score on the second scale of the ABC scales had children who learned to look for dropped objects, and developed a finger-thumb pincer grasp at an earlier age than children of other mothers. Since it was evident in the discussion of patterns of development (see page 231 above) that children who achieved these skills earlier were the children who were slower to walk and older when the first babbling responses were recorded, then a negative correlation with these two latter developmental skills was to be expected.

The one developmental skill which seemed to be most affected by mother behaviour was "looks for dropped object". Two of the ABC scales showed significant correlations with the age at which this skill was first observed. As has

previously been mentioned (Chapter II) the development of object permanence is an important pre-requisite for the development of language. It would appear as though the mothers of those children who developed this skill earliest interacted with their infants, verbally, socially and emotionally, in ways which promoted the earlier development of this cognitive skill.

(b) Relationship of Caregiver's Perception of Own Behaviour (P.A.A.T.) and Developmental Skills

The first point to note is that the multiple correlations between the P.A.A.T. scales and the age of achievement of the major developmental skills are all very high. On average, scores on the P.A.A.T. scales are better predictors of the children's development than any of the other types of assessment obtained. Since the P.A.A.T. scales are all highly inter correlated it is hard to distinguish between them.

The developmental skill that seems most affected by the mother's perception of her own behaviour is the ability to walk alone. There is a moderately strong relationship between a high score of the P.A.A.T. scales and earlier development of the ability to walk alone. Age of crawling and age of laughing are the only other developmental skills to show similar, but weaker, relationships.

Summary

It seems that one scale of the ABC and all the scales of the P.A.A.T. have a significant relationship with the age at which the children's major developmental skills were observed. The developmental skills most affected were "walking alone" and "babbling" (which were positively related to P.A.A.T. scores but negatively related to the second ABC scale) and "looks for dropped object" and "pincer grasp" (which were positively related to the ABC "social emotional positive input" scale, but generally negatively related to the P.A.A.T. scores).

RELATIONSHIPS OF CAREGIVER SCALES TO COGNITIVE DEVELOPMENT

The previous section indicated that there were relationships between measures of mother's behaviours and her perceptions of herself and the age at which children achieved the major developmental skills. The next important question is whether there is the same kind of relationship between the behaviour of the mothers and the development of cognitive skills (the Uzgiris & Hunt scales).

Table 6:34 reports the relevant correlations. A comparison of this table with Table 6:33 indicates that the correlations are generally lower. The median correlation for Table 6:31 is 0.26 while the median correlation for Table 6:34 is 0.20. Thus the caregiver scales show a slightly lower relationship with the Uzgiris and Hunt Scales of cognitive development than they do with the developmental milestones.

TABLE 6 : 34

RELATIONSHIP OF CAREGIVER SCALES TO COGNITIVE DEVELOPMENT

Cognitive Development (Uzgiris & Hunt)		Language Facilitation 1.	Social-Emotional (Positive) 2.	Piaget Tasks 3.	Creativity 1.	Control 2.	Play 3.	Teaching Learning 4.	Frustration 5.
I	Object Permanence	.26	.06	.06	-.05	-.26	.17	.29	-.12
II	Means/Ends	.33	-.24	-.06	.00	- 36	.10	-.07	-.19
IIIA	Vocal Imitation	.07	-.59**	-.50*	-.17	-.48*	-.18	-.20	-.29
IIIB	Gesture Imitation	-.14	-.73**	-.27	-.01	-,01	-.37	.07	-.08
IV	Causality	.49*	.05	.07	.12	-,11	.26	.39	.15
V	Object Relations	-.06	-.26	-.72**	-.21	-.49*	-.51*	-.51*	-.28
Multiple Correlation Squared:		.31	.86	.73	.15	.44	.58	.61	.27

* $p < .10$
** $p < .05$

(a) Relationships of ABC Scale to Cognitive Development

It is apparent from Table 6:32 that both the second scale (social emotional positive input) and the third scale (presentation of Piagetian tasks) shows two quite strong relationships with cognitive development measures and that these are all negative. It appears that, within the intervention sample, mothers with high scores on the social emotional input scale have children with lower scores on the two language scales (III A Vocal Imitation and III B Gestural Imitation).

It also appears as though mothers who scored high on the presentation of Piagetian tasks (the third ABC Scale) had children who had lower scores on one of the language scales (III A Vocal Imitation) and on the Objection Relations in Space measure (V).

The Language Facilitation scale of the ABC did not appear to have any relationship to the Uzgiris and Hunt measures of language development but did have a small positive relationship with the children's understanding of causality (Scale IV).

An examination of the pattern of scores obtained by individual mothers and children indicates that the relationships suggested by the correlations reported in Table 6:32 are not, as might be suspected, due to any unusual

individual or outlying scores. Child J had consistently the lowest scores on the Uzgiris and Hunt measures and there was some reason to doubt the validity of his scores because of (his) marked hearing loss. However removal of his scores made little difference to the pattern of the results.

All four children (F, I, K, M) who had the highest scores on the Vocal Imitation Scale had mothers who fell in the lowest third of the scores on the ABC Social Emotional Positive Input Scale, and three had mothers who fell in the lowest third of the scores on the ABC Presentation of Piagetian Tasks Scale.

Of the five children (C, F, G, I, M) who had the highest scores on the Gestural Imitation Scale, three had mothers who fell in the lowest third of the scores on the ABC Social Emotional Positive Input Scale.

Five children (A, C, I, K, M) had scores of 25 and above on Scale V (Object Relations in Space). The mothers of three of those children were in the lowest third of the scores on the ABC Social Emotional Positive Input Scale and the same three mothers were also in the lowest third of scores on the ABC Presentation of Piagetian Tasks Scale.

It is thus reasonably clear that, within the intervention sample, cognitive development (as measured by the language and object relations scales of the Uzgiris and Hunt)

was negatively related to observational measures of mothers' positive social emotional behaviours and presentation of Piagetian tasks.

It should be remembered that this was an analysis of the relationships occurring within the intervention programme. It was evident from the data reported in Tables 6:9 to 6:15 that the scores obtained by the mothers of the intervention group D.S. children on the ABC and the P.A.A.T. Scales were significantly different from the scores obtained by the contrast group mothers. Against this background, the pattern of negative relationships evident in Table 6:34 suggested that, within the intervention programme, the behaviour of the mother did not have a significant effect in addition to the effect of the programme. D.S. children whose mothers did not obtain high scores on the ABC and P.A.A.T. scales did show significant cognitive development.

(b) Relationships of PAAT to Cognitive Development

In general the P.A.A.T. scores have only a limited relationship to the children's cognitive development. The two measures showing the strongest relationships are the teaching/learning score and the play score. The measure of cognitive development on which these scales have the greatest effect is Scale V (Object relations in space). Again, it is primarily a small but consistently negative relationship. Mothers who score high on the P.A.A.T. scales have children who get lower scores on the tasks included in Scale V of the Uzgiris & Hunt scales.

Summary

Relationships between the caregiver measures and the cognitive development scores are generally lower than the relationships between the caregiver measures and the age of achieving the major developmental skills. Most of the significant relationships with the cognitive development scores are negative. Mothers who score high on the caregiver scales tend to have children with lower scores on the cognitive development scales. Scale IIIA "Vocal Imitation: and Scale V "Object Relations in Space" are the two areas of cognitive development that seem to have been most affected by the mothers within the intervention programme.

RELATIONSHIP OF DEVELOPMENTAL SKILLS TO COGNITIVE DEVELOPMENT

Part of the philosophy of the early intervention programme was that the development of physical skills provided the necessary background stimulus for the development of cognitive skills. Table 6:35 sets out the correlations between the time of acquiring a sample of major developmental milestones and the scores obtained on the measures of cognitive growth.

It is possible to identify from these correlations, those developmental skills which were most closely associated with the acquisition of specific areas of cognitive skill.

TABLE 6 : 35

RELATIONSHIPS BETWEEN DEVELOPMENTAL SKILLS AND COGNITIVE DEVELOPMENT

Developmental Skills	Cognitive Development (Uzgiris & Hunt)					
	Object Permanence I	Means/Ends II	Vocal Imitation IIIA	Gestural Imitation IIIB	Causality IV	Object relations in space V
1. Sits alone	-21	-63**	-54**	07	-07	-45*
2. Crawls	-09	-33	-07	49*	-06	20
3. Walks alone	-05	-19	-37	-31	-14	-02
4. Looks for dropped object	-24	06	27	43*	-31	33
5. Pincer grasp	-23	17	38	52**	-15	27
6. Take/release	-79**	-52**	-09	-23	-27	-10
7. Babbling	-03	04	-06	-56**	36	03
8. Smiling responsively	14	11	48*	25	30	45*
9. Laughing	22	-02	27	-23	24	33

The acquisition of "object permanence" was most closely associated with the development of the "take-release" skill. It is likely that the ability to pick up and release objects allowed the child to explore and manipulate the world of objects, and then relationships, in ways which developed an understanding of the physical independence and permanence of these objects. A great deal of the "search" behaviour initiated by the infant would have required the kind of hand-eye co-ordination involved in the "take-release" skill.

The acquisition of the concept of means/ends relationships seems to have been most closely related to being able to sit alone as well as the ability to take and release objects. It seems likely that the ability to sit alone provides a situation where means/ends relationships can be attempted by the infant. For example, in sitting the child is balanced through trunk, neck and head and as such can use two hands freely for exploration, can rotate his/her trunk right and left and can use his eyes in co-ordination with his hands. The ability to use his/her body in this way is not available to the non-sitting child. The development of physical skills in the infant is in part determined by the tone and flexibility of muscle groups.

The development of vocal imitation skills is also related to being able to sit alone and seems to be negatively related to smiling responsively. There is some suggestion that smiling and laughing responsively (social skills) are

negatively related to the two language measures (vocal and gestural imitation). Gestural imitation is related to babbling, but is negatively related to a group of motor skills (crawling, looking for dropped object and the acquisition of a pincer grasp). The negative correlation between smiling and language (vocal imitation) seems to have been largely produced by the exceptional scores of one particular child (Subject J). This child was reported as smiling responsively at a very early age (four weeks) and also received very low scores on the two language scales. In this case there are two possible reasons for the low scores on the language scales. First, Subject J was known to suffer from fluctuating deafness from 12 months of age, a factor which could well have influenced his language development. Secondly, he was the youngest child to be assessed in the intervention group. If the scores obtained by this child are removed, the correlation between smiling and vocal imitation is reduced from 0.48 to 0.29 and the correlation between smiling and gestural imitation is changed from 0.25 to - -0.06. Neither of these corrected correlations is large enough to be considered significant and so it would be more reasonable to conclude that the language scores have little relationship with age of smiling for most of the children.

Object relations in space, like the concept of means/ends relations, is related to sitting alone and, like vocal imitation, is also negatively related to smiling responsively. Again, the reason for the negative relationship

with smiling responsively seems to be related to the special circumstances of Subject J. Eliminating the scores of Subject J reduces the correlation from 0.46 to 0.21 effectively removing the evidence of any significant relationship between the two variables.

Thus, the dominant relationships seem to be between the acquisition of the take/release skill and the concept of object permanence; and between the ability to sit alone and the achievement of means/ends relations.

Informal Information

As has been mentioned in Chapter III, it was hoped that the early intervention programme would have benefits in addition to those measured by this study. It was observed by this author that the following concerns are relevant within this context.

(i) Families became interested and concerned in the psychological, social and physical development of young children. This was seen in their dealings with subsequent children in the family. They read books, searched out appropriate toys and infant equipment and applied the knowledge gained in the D.S. clinic to their new infants. Mothers often expressed feelings of new enjoyment and involvement with child development in a way not known to them in their raising of older siblings.

(ii) Most families evidenced increased confidence in their dealings with professionals, particularly those in medical or allied fields. Confident communication on their part often led to more satisfactory and mutually helpful relationships with their doctors and paediatricians. Because of their knowledge of D.S. in general and their child in particular, families were frequently able to obtain prompt and appropriate medical care for their child and so frequently avoided possible hospitalisation.

(iii) Parental involvment in the early intervention programme appeared to have some positive (although unmeasured) outcomes on the widersocial sphere SEE ERRATA surrounding the D.S. child. For example, knowledge of D.S. and its effects on the handicapped and his/her family became more broadly known in the community through family and neighbourhood contacts such as play groups, church activities, the workplace, schools, clubs. Visitors to the intervention programme either associated with the family concerned, or with other interested bodies (e.g. health nurses, social workers, educators) helped disseminate knowledge and understanding of the needs of D.S. children and their families.

(iv) Friendship and support networks developed amongst
SEE ERRATA ~~friends~~ parents who were widely differing in ages, social

class and interest. These appeared mutually beneficial and were enduring over time. It was observed that those individuals with greater strength and skills often helped (both practically and emotionally) those who appeared less able to cope.

(v) The continuation of this intervention programme for D.S. infants should over time influence and contribute towards changes in the economic and political system of New Zealand. Such changes should be reflected in the rights of the handicapped in general (legislation for equality of opportunity) and the beliefs and value systems concerned with the expectations of individuals with D.S.

SUMMARY OF THE RESULTS

In the initial intervention sample of fourteen D.S. infants and the initial sample of ten contrast D.S. infants the most common difficulty affecting development and subsequent life-span was congenital heart abnormality. Other difficulties were hearing impairment due to otitis media, visual impairment, prematurity, exomphalous and apnea attacks in the neonatal period. With the exception of one infant (balanced translocation) all subjects in this study were standard trisomy 21. Of the final intervention sample (eleven infants) all except Subject G were raised by their natural

parents. Mothers' ages at the birth of the D.S. child ranged from 18 to 47 years (intervention group) and 23 to 42 (contrast group). Fathers' S.E.S. for the intervention group was between 1 and 5 and 3 and 5 for the contrast group.

1. Monitoring of infants' development

A steady, stepwise progression in all skill areas was achieved by the intervention sample by two years of age. Compared with the Share & Veale norms for New Zealand D.S. infants, the intervention sample was accelerated in all aspects of development. Compared with normal infants (Sheridan) the expected deviations were apparent. However, certain positive outcomes can be described. There were a number of skills, (smiling, laughing, grasping etc.), in which the intervention sample developed within normal limits.

Individual patterns of development within the intervention sample indicated that some children showed a significant disparity between the development of physical skills and skills related to cognitive development. However, there appeared to be a compensatory process at work in these children which equalled out the different areas by age two.

The parents appeared to have carried out the procedures they were trained and encouraged to use and these procedures seem to have been equally effective for all the children, despite the range of handicap (e.g. very poor muscle tone). The intervention infants demonstrated improved physical

development (gross and fine) and the beginnings of language and personal-social skills at levels not very different, in many cases, from the range of normal development. The areas of least progress were in gross motor and expressive language skills.

2. Assessment of the home environment

The H.O.M.E. Scale was used to measure the quality of the D.S. child's home. The differences between the intervention and the contrast groups were small. However, since almost all of the scores fell near the top of the scales, it is likely that the H.O.M.E. inventory does not discriminate adequately between the home environments of New Zealand children.

The ABC scale was used as a measure of caregiver interaction with the D.S. infant. The scales of language facilitation, social emotional inputs and the presentation of Piagetian tasks, each showed a difference between the two groups in the study. The intervention group mothers used language and social contacts in a greater variety of ways with their infants than did the contrast group mothers. The content of their language indicated a greater ability to elicit vocalisation from their children. In addition, reading to and playing with their children was found to occur more frequently in the intervention group mothers, although this finding was not statistically significant. Their social contacts reinforced their language facilitation with a greater

degree of eye contact, smiling and reassuring and the playing of social games. The intervention group caregivers promoted the development of sensorimotor behaviours in their children and presented Piagetian tasks much more frequently than did the contrast group, although only one behaviour, imitation, was found to be statistically significant.

The P.A.A.T. inventory was used to assess parents' perceptions of themselves as teachers of a handicapped child. The parents of the intervention group ranked more consistently in the top third of all parents in creativity, control and play analysis, indicating that, in general, the intervention group parents had a higher self perception in these areas of parent-child interaction.

3. Assessment of infant's cognitive development

The Uzgiris & Hunt scales were used to assess the infant's level of cognitive development. The intervention group scored higher on Scale I (the development of visual pursuit and the permanence of objects); Scale III (a) (vocal imitation); Scale III (b) (gestural imitation); Scale IV (the development of operational causality) and Scale V (the construction of object relations in space). The results of Scale VI, (the development of schemas for relating to objects), suggested that the intervention group displayed a greater number and greater range of schemas for relating to objects than did the contrast group.

4. Relationships Between Factors Operating within the Programme

The final section of the results dealt with the effects of the programme on individual children, and the interaction of the programme with the conditions and people involved with it. The relationships between the following variables were examined:

(i) degree of abnormality

(ii) father's S.E.S.

(iii) family size

(iv) the three most significant ABC Scales (1, 2 and 3)

(v) The P.A.A.T. Scales

(vi) Uzgiris and Hunt subscales I, II, III (a), III (b), IV and V

(vii) A selection of significant developmental skills (sits alone, crawls, walks alone, looks for dropped object, pincer grasp, take/release, babbling, smiling responsively, laughing)

Degree of Abnormality

The presence of a physical abnormality in the infant appeared to have a significant delaying effect on language development as measured by the two language scales of Uzgiris & Hunt. It was also evident from the results that parents' attitudes (P.A.A.T.) were affected by physical abnormality, but this effect was not evident in their observed interactive behaviour (the ABC scale).

Effect of Socioeconomic status

Parents' perceptions of their behaviour as caregivers (P.A.A.T.) were consistently correlated with fathers' S.E.S. Examination of the effects of S.E.S. on development and cognitive skills did not indicate that children from more advantaged homes benefited more from the intervention programme than children from less advantaged homes.

Effect of family size

Family size had little effect on the development of children in the intervention sample or on the behaviour of their caregivers. A slight delay in smiling and laughing among children from large families was apparent.

Relationships between caregiver behaviour and developmental skills

Of the three ABC Scales the one with the strongest relationship with the progress of developmental skills was the mother's positive social inputs. Parents' perceptions of themselves as caregivers (all the P.A.A.T. scales) were also strongly related (particularly with babbling and walking alone).

Relationships of caregiver scales to cognitive development

There was a generally lower relationship between cognitive scores and caregiver measures than between caregiver measures and the age of achieving major developmental skills. Most of the significant relationships with cognitive development scores were negative.

Relationships of developmental skills to cognitive development

The developmental skills which had the most marked effect on cognitive development were the "take/release" skill, which was significantly correlated with object permanence, and "sitting alone", which was also related to "take/release" and means/ends relationships, vocal imitation and object relations in space.

CHAPTER VII

DISCUSSION AND CONCLUSIONS

INTRODUCTION

The formal results and the contextual information obtained from this study will be discussed in this chapter within the ecological framework outlined by Bronfenbrenner (1979). The significance of Bronfenbrenner's perspective is that it emphasises not only the child's interactions and experiences within the family (microsystem) but also the influences on the child and family of the larger environment (the meso, exo and macrosystems).

It has been claimed (p 111) that the intervention programme described in this study was a new microsystem which interacted with, and was designed to strengthen, the family microsystem in both formal and informal ways. Emphasis was given to the importance and power of the mother-child dyadic system within the structure of the early intervention programme. According to Bronfenbrenner (1979), "Recognition of this relationship provides a key to understanding developmental changes not only in children but also in adults who serve as primary caregivers" (p. 5). The critical importance of this relationship has also been supported by Grobler (1973), Brophy (1970), Haynes (1976) and Bidder, Bryant and Gray (1975). At the time this study was undertaken

however no other early intervention programmes for D.S. children appear to have attempted to incorporate a similar ecological perspective. Only the studies by Rynders and Horrobin (1980) and Sandow and Clarke (1978) took serious account of the family and family support systems in designing an intervention programme.

In summary the ecological systems described by Bronfenbrenner are as follows:

(1) The family microsystem
(2) Mesosystems in which family members interact
(3) The exosystems in which the mesosystems are embedded
(4) The macrosystems which are made up of the broad beliefs and values of a society

The discussion of the family and intervention programme microsystems which follows concentrates primarily on the microsystem as a developmental context for D.S. infants. This perspective served as the major focus for the intervention programme and provides an appropriate framework for discussing the results of the study. In general the results obtained indicated that the children who participated in the early intervention programme were more advanced by about 2.6 years then the available norms for D.S. children suggest they would otherwise have been. However, individual differences were apparent with respect to rate of progress across different skill areas. The way in which the intervention programme

produced this effect can be seen by considering the ecological system in which it occurred.

The Family Microsystem:

As indicated previously, the intervention programme involved the setting up of a new microsystem designed to interact with and strengthen the primary family microsystem. This involved maintaining an active and ongoing set of relationships between parents and professionals and parents of different families.

Three different measures were used to assess the effects of the intervention programme on the way parents interacted with their D.S. infants within the primary microsystem. The A.B.C. and H.O.M.E. Scales provided an indication of primary caregiver behaviour, while the P.A.A.T. provided a measure of parental attitudes and perceptions of themselves as teachers.

Unfortunately the H.O.M.E. Scale proved to lack discrimination within the range of families observed in the intervention and contrast groups. As evidence obtained from a study by McMillan (1981) indicated, it is probable that there is a marked ceiling effect when the scales are used in the cultural context of southern New Zealand cities. The one intervention study reviewed in Chapter 2 which attempted to measure the home environment also used the H.O.M.E. Scales (Piper and Pless, 1980). They found no significant differences between the experimental and contrast groups

except on the "provision of appropriate play materials" scale.

The second observation measure used to measure the differences between the families of the intervention and contrast group children was the A.B.C. Scales. The results of the Language Facilitation and Social Emotional Positive Input Scales indicated that the primary caregivers in the intervention group families used language and social contacts in a greater variety of ways. However, no differences were observed in the total time spent conversing with their D.S. children, in the time spent showing praise or encouragement or in labelling sensory experiences. The evidence is clearly mixed but there is reasonable cause to believe that some significant changes were taking place in the pattern of interactions that occurred between the D.S. children and their mothers.

The results from the P.A.A.T. suggest that the perceptions the parents had of themselves as teachers did not show significant ~~development~~ differences when compared with the perceptions of the parents in the contrast group. The results of the P.A.A.T. present an interesting problem because some of the parents who perceived themselves as less adequate as teachers in fact showed a high level of positive behaviour when observed on the A.B.C. Scales. One solution to this problem is that the structured and unstructured learning experiences provided through the intervention programme were effective in changing the parents' behaviour but not in changing their perceptions of their relative adequacy as

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teachers. Since the programme provided for constant interaction between the families, the parents may have changed their standards of judgment of their own adequacy as teachers in an upward direction compared with parents of children in the contrast group who did not have opportunities for the same mutual support and modelling.

Given that there were some measured changes in the behaviour of the parents of the D.S. children in the intervention sample, and possibly in the standards by which they judged their own adequacy as teachers, the question arises as to what aspects of the programme could have been responsible for these changes. The informal information obtained by observation and recorded notes during the progress of the intervention suggest that the following factors may have been influential.

1. Early Acceptance of the Child: It was observed that mothers experienced early psychological acceptance of their infants. This process was encouraged and assisted by providing early and continuing support by other parents and professionals who were participants in the early intervention programme microsystem. The birth of the handicapped child involved an ecological transition or change of role for all families. The families in the intervention programme received support and information from other participating families and professionals in order to assit them to feel, think and act positively in their new role (vid pp 144-145).

2. Developmental Programme as a Focus for Bonding: Early developmental programming of the D.S. infants provided a positive focus for parents as they attempted to accept the diagnosis of a handicapped baby. The parents' commitment to and involvement in their child's development probably assisted them in establishing strong and enduring parent-child bonds. Bronfenbrenner (1979) has suggested that the two person dyad is developmentally significant because as one member of the pair undergoes a process of development the other does also. An awareness by parents of the need to handle and relate to their babies in stimulating and appropriate ways ensured the early development of caregiver behaviours such as smiling, laughing and eye to eye contact. In the review of intervention studies it was noted that Berger and Cunningham (1981) reported the significance of these behaviours for the development of appropriate interactive sequences between mother and infant.

3. Developmental Programming as a Focus for Engaging the Infant in Molar Activities: As the above mentioned communications frequently took place as part of an opportunity for sensorimotor experience they had the characteristics of "molar activities". The significance of molar activities for the developing child "is a function of the scope and complexity of the molar activities engaged in by others that become part of the child's psychological field either by involving her in joint participation or by attracting her attention" (Bronfenbrenner 1979 p. 48).

Parents involved in the intervention programme were encouraged by education and modelling to engage in molar activities with their infants around appropriate developmental tasks. An example of the ways in which this was observed to occur was when assisting a child to roll from supine to prone, the developmental significance of the skill was understood within the whole context of development and reciprocal relations which follows from the ability to move one's body in order to act on the environment.

4. Effect of Support Systems on Attitudes and Activities: Early, positive and realistic attitudes towards their D.S. infants and practical and theoretical knowledge of the syndrome in combination with a range of effective support systems may have enabled the intervention mothers to use language and social contacts in a greater variety of ways when interacting with their D.S. infants.

Bronfenbrenner (1979) has suggested that whether parents perform effectively as child rearers (e.g. talk to their children or encourage others to do so) depends on the support systems available to them to cope with the role demands and stresses. This intervention programme was designed to increase the support systems available to families, both directly through the activities, roles and relationships introduced in the new intervention microsystem and indirectly through assistance with child care arrangements for other siblings and domestic relief (vid. pp 144-145). Again, Bronfenbrenner (1979) has suggested that parents'

evaluations of their own capacity to function and their view of their child is related to such external factors as child care arrangements and support services.

In order to further strengthen the family microsystem and enable parents to be more effective child rearers, the intervention programme also created new systems to aid the development of the parent-child dyad. Examples were the six-weekly paediatric clinics for D.S. infants and the visits of the cytogeneticist to the intervention programme.

5. Mother to Mother Relationships: It is likely that the mother-child interactions observed by the other mothers during the intervention clinic, when they met together in informal social groups or travelled to and from the intervention programme together, provided both a modelling experience and a supportive psychological experience for newer mothers. Mothers reported that after watching and listening to other parents they experienced changes in their own interactions with their D.S. babies. The common experience of having given birth to a child who is different produced a more immediate and intimate quality of contact between the mothers from that normally characteristic of contacts with professional persons. Observational dyads developed between mothers whose babies were closest in age. Some mothers obviously served as role models to illustrate that it was possible to survive such an event.

6. Recognition of the Significance of N+2 Dyads: The intervention programme recognised the importance of the N+2 dyads for the developing child. It has been suggested by Bronfenbrenner that if the father's relationship with the mother is positive, especially in her child rearing roles, that her effectiveness in caring for her infant will be increased along with the quality of the mother-child interaction. Fathers were encouraged to participate in the intervention programme in a variety of ways:

(a) Initial contact following the birth of the D.S. child was always made with both parents and subsequent meetings in the hospital continued to involve the father when possible. Such contacts helped fathers to understand the nature of D.S. and provided supportive listening while talking through the fears and anxieties associated with the diagnosis of an imperfect child.

(b) Fathers were encouraged to attend the intervention programme with the child's mother as often as possible. All fathers managed to do this within the constraints of work commitments. Fathers frequently attended the clinic on their own with the D.S. child when family illness or other commitments prevented the mother attending.

(c) The informal social networks which developed between families encouraged reciprocal exchanges of information and support between the fathers. Mothers reported that their husbands felt the benefit from these contacts.

Further N+2 dyads developed within the families with neighbours and extended family members. Bronfenbrenner (1979) suggested that such second-order effects operate to provide advice, information and support, to reinforce initiative and to facilitate the formation of new social relationships.

As parents began to feel more positively towards their handicapped child and became committed to the activities of a developmental programme it was observed that their relationships with neighbours and extended family members became more open and they reported that the responses of neighbours towards them became less anxious and more supportive. Parents were encouraged to take the initiative for opening conversations about the new baby with neighbours in the following way:

"Our baby has D.S. We have accepted him/her, and we hope you will too".

The picture gained from the family and parent measures and the informal observations and records of the programme in operation suggest that the programme did strengthen the mother-child relationship within the context of the home microsystem by providing opportunities for parents, professionals and significant others to share experiences around activities which were challenging to the child.

It seems likely that this effectiveness was derived jointly from the structured teaching the parents received

within the programme and the nature of their shared experiences and the emotional and practical support they derived from the network of relationships established by the programme.

There is ample evidence in the literature to support the belief that the family microsystem is critical in the psychological development of children (Holzman, 1974; Dennenberg, 1967; Wachs et al., 1971).

The kinds of home circumstances most consistently related to psychological development in young children are the intensity and variety of experiences to which the infant is exposed, together with the opportunity to hear vocal signs for specific objects, actions and relationships. As Buim, Rynders and Tunure (1976) and O'Kelly-Collard (1978) have suggested, untreated D.S. children receive a different linguistic style from normal children. In the present study any distortion of the mother-child relationship as a consequence of the handicapping condition was minimised and the parents' effectiveness as teachers was maximised.

Most of the studies reviewed in Chapter 2 did not measure the functioning of the mother-child dyad or family microsystem. Although all the studies, with the exception of the institution or drug therapy based studies, referred to the importance of the mother in the intervention process, her role was not usually observed or assessed in any systematic way. Mother-infant interactions were also not systematically

recorded except by Berger and Cunningham (1981).

Bidder, Bryant and Gray (1975) focused their intervention on the parents' needs and reported that parents experienced feelings of improved morale and understanding as a consequence of intervention. However, the success of their intervention was reported in terms of gain scores in the D.S. infants without relating these gains to measures of change in parents' perceptions.

Sinson (1977) and Crowe (1975) also described their interventions in terms of parent-to-parent support and professional guidance. Again, however, these two studies provided no clear description of the way in which this type of intervention was successful. Likewise Sandow & Clarke (1978) reported sampling parental attitudes but did not report results.

Increased family involvement was seen by Bricker (1978) as a way of measuring the success of intervention. She suggested that one of the most important measures of programme success may be whether significantly fewer families suffered serious disruption or stress.

Although this criterion is frequently mentioned as a goal of intervention (Sinson (1977), Crowe (1975), Bidder, Bryant and Gray (1975), none of the studies reviewed in Chapter 2 reported findings which related to family disruption and stress.

A major factor in this study was the importance placed on a network of services and support systems designed to strengthen the home microsystem as the primary dispenser of intervention. Parent participation alone cannot be considered the only necessary component for effective intervention. Children's problems may not be solved by more parent involvement. Intervention must be concerned with the many variables which may impinge on the mother-child dyad with the family.

The Mesosystem:

Bronfenbrenner (1979) has defined the mesosystem as a "set of interrelations between two or more settings in which the developing person becomes an active participant, whereas in a microsystem the molar activities, N+2 system dyads and role activities all occur within one setting. In the mesosystem these processes take place across setting boundaries". p. 209.

Multisetting participation is the most basic form of interconnection between two settings. It occurs when the same person participates in activities in more than one setting. When the developing person participates in more than one setting of a mesosystem, he/she is referred to by Bronfenbrenner as a primary link.

The intervention programme was designed to be seen as another setting in the mesosystem into which the mother-child

dyad moved following the diagnosis of D.S. (linking dyad).

An ecological transition occurs as a person or persons moves from one setting to another. Bronfenbrenner (1979) hypothesised that "the developmental potential of a setting in a mesosytem is enhanced if the person's initial transition into that setting is not made alone but in the company of one or more persons with whom he/she has participated in prior settings". p. 211.

In this intervention programme the effectiveness of the family microsystem was enhanced by linkages between related systems. Entry of new parents to the programme was always made in the company of the staff member who had visited the parents in hospital following the birth of the D.S. child. Although it was not possible for parents to fully understand the exact nature of the intervention programme before they attended, they were given a number of opportunities to discuss it with both staff and another parent prior to their first visit to the clinic. New parents were also visited in hospital by a family with a D.S. baby who attended the intervention programme. Families therefore moved into the intervention programmme with the additional support of another family who had already been through the initial trauma and anxiety normally experienced by new parents of a D.S. child.

Similarly, supportive participation in settings outside the intervention programme occurred when parents and children attended regular paediatric clinics and hearing and visual

assessments. Parents were accompanied by a staff member to medical assessments to ensure that problems were fully described and satisfactory solutions obtained. It was noted that during the course of these visits, which were set up specifically to aid the development of the D.S. child, feelings of mutual trust, positive orientation and goal consensus developed between the medical specialists and the parents. Bronfenbrenner (1970) has sugested that such consensus between settings leads to an evolving sense of power within the mother-child dyad.

Bronfenbrenner (1970) has emphasised the importance of supportive links between settings. In this study the intervention staff provided supportive links between settings by means of home visits, setting up hospital appointments, play groups, parents' informal social groups, and providing transport for families. These supportive links ensured that relevant information and advice was made available on a continuing basis between settings. An example of this process occurred during a regular clinical paediatric assessment when open discussion frequently occurred among paediatrician, parents and staff member about developmental progress, the home situation, behavioural management, health management, involvement of other medical or non-medical agencies, levels of emotional stress within the family and social or financial difficulties which were affecting the home.

Respect and understanding of individual differences in family structure, ethnic or religious background, parenting

style and economic circumstances were considered to be of prime importance when families became involved in the programme and began therefore to participate in a number of new settings because of their handicapped child.

Bronfenbrenner (1979) regarded the mesosystem as having optimal power for maintaining development if it contained the same three functional parameters as the dyad, that is reciprocity, balance of power and affective relation. Because the intervention programme functioned outside an institutional structure (e.g. hospital or university) the interpersonal relations between the parents and staff were not controlled by an existing socially sanctioned system. The programme was physically located in a community based Plunket Rooms and there was not the same tendency for those in a subordinate position (e.g. parents, extended family) to respond by increased dependency or lack of initiative. All parents reported that attendance at the weekly clinic was a pleasurable, non-threatening experience which they actively looked forward to each week.

It was noted that participation in the intervention programme led to both siblings and parents engaging in new activities in a range of settings within the mesosystem. For example, several parents reported that when they visited the school attended by a sibling they took the opportunity to discuss the condition and educational needs of their younger D.S. child with school staff. These parents reported that these visits seemed to be helpful both to them and to the

school staff. It was also reported that siblings of the D.S. child gave talks at school about their brother/sister and described his/her needs, educational programming and the role the family played in encouraging his/her development. Similar discussions were reported in other settings such as church groups, sporting clubs or work.

The Exosystem:

The exosystem has been defined by Bronfenbrenner (1979) as consisting of "one or more settings that do not involve the developing person as an active participant but in which events occur that affect, or are affected by, what happens in that setting". p. 237.

The forms of linkage, communication and availability of knowledge which define the optimal properties of the mesosystem also constitute optimal conditions for exosystems.

No attempt was made in this study to measure the influence of the exosystem on the developing child or his/her family. However, observation and anecdotal reports collected by the researcher suggest that the intervention programme may have influenced the exosystem in a number of ways. The following examples illustrate how this may have occurred:

(i) Toy Library Service : The Toy Library Service visited the intervention programme on a monthly basis. The researcher noted that over a period of time the toy library volunteers became especially interested in the D.S. children and spent

considerable time discussing each child's needs and educational programming with parents. The Toy Library volunteers reported positive benefits both for their own knowledge as individuals and also in their work with other families with handicapped or developmentally delayed children. They reported that they had developed their knowledge of how particular toys could be used to encourage developmental skills in handicapped children and to select toys and equipment which were more appropriate to the developmental needs of the programme children.

(ii) Plunket Society : When the early intervention programme began in the community Plunket Rooms an arrangement was made for plunket tutors to observe the programme. Because these visits proved valuable, the tutors also brought groups of students to the programme on a regular basis. A member of staff was asked to speak at several "in-service" days or post-graduate courses organised by the Society. Individual nurses who were caring for a D.S. baby also visited the programme to learn more about its functions and structure. Both parents and nurses reported that this was a positive experience of mutual benefit. It seems likely that the increased understanding on the part of the nurses, together with the trust and consensus of philosophy developed between the parents and the nurses had a positive influence on the developmental management of the D.S. children.

(iii) Genetic Counselling : The programme arranged for a cytogeneticist to visit the clinic on several occasions (vid.

144-145). Information was provided for parents on individual karyotypes, risks, rates, causes, amniocentesis techniques and other related issues of concern to parents. Parents were shown photographs of the arrangement of chromosomes in their children. They reported that

(a) they were less anxious about and better able to explain to others the nature of their child's abnormality;

(b) they understood the risks of further pregnancies;

(c) were more inclined to ask for further medical involvement in genetic counselling and assistance from the amniocentesis service.

(iv) La Leche League : It was important that mothers of D.S. babies be encouraged to breast feed their infants in order to assist in the formation of mother-child bonds, gain the nutritional and immunological benefits of human milk and to aid the development of the musculature required for speech, mastication and swallowing. The La Leche League was mobilised by the programme for this purpose and parents indicated that it was of considerable support and practical help with the feeding problems often encountered by mothers of D.S. babies. In addition to the help provided for the mothers, La Leche League helpers reported that they developed an understanding of the particular problems associated with feeding D.S. babies. La Leche helpers reported that they discussed D.S. babies and the intervention programme at the League meetings

in order to educate and inform other members.

(v) Hospital Clinics : As described above the paediatric clinic which was set up together with the early intervention programme provided support for both the medical management and the social and emotional aspects of caring for a D.S. child. The paediatrician who administered the D.S. clinic reported a change in his attitude towards D.S. infants following completion of the first year of the early intervention programme. He concluded that frequent and open discussions at the clinics, assisted by a member of the early intervention team, allowed him to gain a more comprehensive picture of the functioning of the D.S. child and his/her family. He also noted that early treatment of health problems resulted in healthier children and a noticeable decrease in hospitalisation.

The paediatrician concerned reported a high level of personal satisfaction from his continuing involvement with the parents as a consequence of the early intervention programme.

It is likely that the good developmental progress made by all children in this study, highlighted by the results of the developmental assessments, was itself reinforcing for all professionals who were involved with the children.

By the completion of the study the paediatrician had moved his D.S. clinic from the hospital to the early intervention clinic where he could observe and learn from the

operation of the programme.

The Macrosystem:

Bronfenbrenner (1979) described the macrosystem as "the consistency observed within a given culture or subculture in the form and content of its constituent micro, meso and exosystems, as well as any belief systems or ideology underlying such consistencies". p. 258.

Early intervention for D.S. children was a new concept for New Zealand at the time this study began. The I.Q. classification attributed to these individuals was "trainable" as opposed to "educable". The early intervention programme designed for this study described a new way of looking at this group of handicapped children.

If the programme was successful or believed to be successful by participants at the microsystem and mesosystem levels then its reputation should spread out through the exosystems to the macrosystem.

There is no way of knowing with a programme of this kind how far this process might have occurred or will continue to occur as the children reach school age. The discussion in the previous section indicated that the programme had an educative effect on members of several voluntary organisations and professional groups associated with the programme. The children's evident developmental progress must have also had an educative effect on many of those with whom they came in

contact. Although it is clearly beyond the scope of this study to consider the determinants of cultural attitudes to handicapped persons, the effect of a programme which is believed by all those involved with it to have been successful must be a significant, positive factor in changing these cultural attitudes.

COGNITIVE DEVELOPMENT

Although the cognitive development and the developmental status of the D.S. infants involved in the study have the properties of both cause and effect (vid. figure 6:1), the following analysis is presented as evidence of the effectiveness of the intervention programme. Greater cognitive and developmental gains were demonstrated in the intervention group subjects than were apparent in the contrast group.

In addition to the theoretical work of Bronfenbrenner, the conceptual and empirical work of Piaget and his associates provided the second major basis for the design of the early intervention programme (pp. 87-100).

The major emphasis in the design of the activities was the need for a systematic programme of activities appropriate to normal developmental levels, special emphasis was placed on the transition from one critical stage to the next, in particular the relationships between the development of object permanence and language and pre-verbal communicative

behaviours such as eye contact, smiling and laughing.

The results of the cognitive assessments of the D.S. infants indicate a substantial difference between the two groups. The intervention group, although differing in levels of cognitive competence, all scored at a consistently higher level on the Uzgiris and Hunt Piagetian Scales than did the contrast subjects. Of particular note was the area of language where none of the contrast infants scored at all.

The review of the literature suggests that a strong relationship exists between advanced sensorimotor functioning and communicative behaviour in both retarded and non-retarded children. (Greenwald & Leonard, 1979; Mahoney, Glover and Finger, 1981 and Corrigan 1978). The important behaviour of object relations typically acquired late in the sensorimotor period may be a pre-requisite to expressive language development. Thus, children operating only within the early sensorimotor modalities may not have the cognitive structure necessary for language. Bates, Benigni, Bretherton, Camaioni and Volterra (1979) have suggested that there now exists a general consensus with Piaget's (1952) notion that this developmental period is marked by the emergence of the skill to separate action from objects and therefore to distinguish cause and effect (means-ends) relationships.

Recent research and theory indicates that the emergence of these abilities is important in the development of basic cognitive ability. (McCall, 1979; Collins and Hagan, 1979;

Trevarthen and Hubley 1978).

It is interesting to note that in the two groups of delayed infants reported in this study, the same pattern can be seen. The critical sensorimotor behaviours (as measured by the Uzgiris and Hunt Scales) of object permanence, (Scales I and V) and means-ends relationships (Scale II), did indicate a greater level of maturity in the intervention group subjects, although the differences were not statistically significant. The differences between the two groups were however significant on the Uzgiris and Hunt vocalisation scale. This is a possible reason for the lack of language development in the contrast group.

It is interesting to note that the achievement of the stages of object permanence (which is considered to be a core achievement of sensorimotor intelligence) has been shown to vary little with socio-economic status or cultural group.

The importance of the pre-requisite skills necessary for the transition from the Piagetian Stage III to Stage IV was recognised by the intervention programme, and it is possible that this had a significant effect on the accelerated development of these infants with respect to the "search for objects".

It is commonly suggested that the differences between the normal and the D.S. infant are not particularly marked up until nine months of age after which the gap widens

substantially and differences in developmental milestones become strikingly obvious. This may be because the untreated D.S. infant does not have the pre-requisite skills, sufficient level of curiosity or muscle-tone development to advance readily in thinking from Stage III to Stage IV. It should also be noted that because the majority of infants (normal and D.S.) are still immobile and usually spend long periods of time in bed up until this age any differences in cognitive competence will not necessarily be apparent.

The results of this study show that the affective behaviours of responsive smiling and laughing were considerably accelerated in the intervention group by comparison with other New Zealand D.S. infants (Share & Veale norms). The literature suggested (Ciccehetti & Sroufe, 1976) that all retarded subjects exhibit the same invariant, but also the same delayed, sequence of affective expression and associated level of cognitive development. It is suggested here that the accelerated level of affective expression found in the intervention subjects was directly related to the importance placed on the development of these behaviours by the intervention programme.

Factors external to the programme such as presence of an abnormality in the infant, socio-economic status or family size, had limited effects on either developmental or cognitive skills in the infants or on parents' self-esteem or caregiving behaviours. This would suggest that the programme was effective in taking account of these variables when providing

intervention procedures for individual children and their families.

The intervention programme aimed (with the help of the physiotherapist) to promote from birth the development of physical skills in D.S. infants, on the basis that these were likely to be delayed because of poor muscle tone and reduced motivation. The results indicated that the accomplishment of physical milestones was accelerated in all intervention subjects (compared with Share & Veale norms) and was either within normal limits or slightly below (compared with Sheridan norms) in a majority of cases. The development of competent physical skills in the sensorimotor period provided the intervention group infants with the operational tools for learning from their environment. This view is supported in the literature by Piaget's theory of cognitive development.

The intervention programme appeared to be successful in helping participating parents adjust to the reality of their handicapped child. After the initial crisis involving the birth had passed, none of the eleven families was observed to regress in its acceptance of its child, and no parent was known to require medical attention for depression or associated problems. The continuing provision of opportunities for supportive listening provided by the professional team, in addition to parent-to-parent support, appeared to be a useful way of helping those concerned.

PROBLEMS WITH SAMPLE SIZE AND METHODS OF ASSESSMENT

One of the major problems with interpreting the data obtained from the formal objective measures of caregiver behaviour and cognitive development has been the small number of cases involved in both the intervention sample and the contrast group. Conventional experimental designs assume a virtually infinite population from which experimentally manageable samples are drawn. Small numbers (e.g. 20 or less) are presumed to be relatively inadequate as a basis for generalisation. In these terms, the size of the samples in the study were relatively inadequate and the apparent differences between the intervention and contrast groups should be treated with extreme caution.

It should be remembered however that the samples used in this study consisted of all the children diagnosed as having D.S. in two moderately large cities over a period of approximately two years.

Of the fourteen referred in one city, three died at an early age, leaving eleven to be included in the intervention sample. Of the ten referred in the other city, four died before assessment was possible and two moved out of the area leaving four to be included in the contrast group. Thus, of the twenty four D.S. children born over a two year period in two moderately large urban areas, all, except for two who moved out of the areas, were included in the sample.

Although standard statistical inference procedures were used in Chapter 6 to test for the statistical reliability of the differences observed between the two groups, these must be seen as a very conservative means of estimating the practical significance of the differences. Standard statistical inference procedures presume an infinite parent population and random selection of the samples. In this study the population of interest is relatively small (about 0.16% of live births) and the sample was a convenience sample representing an estimated 14% of the national incidence over a two year period.

The important issue when judging the significance of the differences found between the intervention and the contrast groups is not the small size of the groups but the degree to which they represent the larger population of all D.S. children. The procedure of including all children born over a two year period precludes any ad hoc selection of cases by the researcher, parents or related professionals. What was selected was the two year period and the cities in which the study was carried out.

There was no reason to believe that the two year period was in any way different from any other two year period which might have been selected. No cyclical or historical changes in the characteristics of D.S. children are known. The cities selected have populations of predominantly European origin and cannot be seen as under or over representing any ethnic factors known to be related to incidence or types of D.S.

Given that the sample of D.S. children included in the study was small but probably representative of all the D.S. children born in the country at the time of the study, then the other major factor affecting the reliability of the findings is the measurement procedures employed.

As indicated in Chapter 5, there were problems involved in maintaining consistency in the timing and use of the formal assessment procedures. While there is no reason to believe that any of the unreliability in these measures was systematically related to differences between the intervention and contrast group children, real problems in applying formal measurement procedures to young handicapped children should not be ignored.

Any doubts about the meaning of the differences found between the intervention and contrast groups should focus on this problem rather than apparent inadequacies in the size or representation of the samples.

The evaluation methods used in this study involved a combination of both objective and contextual assessments. The measures used were an attempt to achieve congruence between the questions asked, the methods used and the conceptual basis of the study (Scott, 1980). Uzgiris (1976) suggested in support of this type of evaluation that "there seems to be a consensus that development in sensorimotor functioning is multifaceted and must be assessed in more than one domain", p.

159.

SUMMARY OF THE RELATIONSHIP OF THE THEORETICAL POSITIONS WHICH TOGETHER COMPRISED THE EARLY INTERVENTION PROGRAMME

The programme described in this study attempted to take account of both the "context" and "content" in the development of early intervention for D.S. infants. The success of the programme depended upon an effective context including the D.S. clinic, the family, other families and supporting professionals. In addition, the communication between these differing systems was seen as important.

However, the "context" alone would not have been sufficient without an effective content for the programme. In this regard the theoretical and empirical framework of Piaget was used to identify those aspects of infant development which seemed critical for D.S. children. For example, transitions from one critical stage of sensorimotor development to another, the development of smiling and laughing and the development of object permanence.

The ecological model of Bronfenbrenner provided the effective system ("context") in which significant sensorimotor activities for D.S. infants could be incorporated.

THE ROLE OF THE RESEARCHER IN INTERVENTION

The role of the researcher is an important factor in the effectiveness of any experimental intervention programme. The experience obtained in this programme suggested the following are important aspects of this role:

(i) The researcher must be clear as to which skills he/she does have to offer and which he/she does not have to offer.

(ii) The relationships which develop between the researcher and the participating families must not become personal friendships. The social role of the researcher must combine empathy with objectivity. The relationships which develop involve helping parents to take responsibility for their own children and for their actions towards them. Parents should always understand the significance of the intervention procedures they are involved with. They will be more motivated and more involved in the whole process of child development if they appreciate the relevance and importance of their actions.

(iii) The researcher must understand the continuing nature of the processes of grief. Parents continue to re-work their feelings over a long period of time and at certain points may need further support in order to face the reality of a handicapped child. Such times

may include uncertain health in the D.S. child, imminent death from disease, rejection from person or persons in the community or the reality of delayed physical and intellectual development. It is not ethically defensible for those involved in this type of research to set up programmes which serve merely a finite scientific end and offer no continuing help or support.

THE CHILD IN INTERVENTION

The processes of intervention are interactive as are developmental processes within the sensorimotor period. Cognition, language, social and physical development must be considered equally important. Their function will necessarily be affected by such factors as quality of muscle tone, physical health of the infant, as well as the quality of mother-child interaction. This means that any attempt to isolate specific causal factors within an intervention programme is essentially an artificial task.

LIMITATIONS OF THE STUDY

As has been previously mentioned, the present study was not a true experiment. The numbers in both samples were small thus making statistically valid conclusions problematic.

Assessment of Subjects

Ideally the outcome assessments of the D.S. infants should have been carried out by one tester. Each measure

should have been administered on three separate occasions (with a seven day interval) in order to obtain a more reliable sample of infant and caregiver behaviour. Due to factors (both economic and practical) beyond the control of the researcher these were not possible to implement. Also interactional observational measures (within the home microsystem) could have been obtained. These would have included regular mother-infant interaction sequences, father-infant interaction sequences and sibling-infant interaction sequences.

IMPLICATIONS AND RECOMMENDATIONS

The importance of, and justification for, this type of study lies in the combination of both the theoretical and practical. Behaviour and environment must always be viewed as interdependent when setting up intervention procedures. The present study did not fit the experimental model of scientific research. The focus of ecologically valid research is to "to aim in application for comparability and translatability of findings rather than for outright transference to groups not investigated" (Le Compte & Goetz, 1982, p.34).

In this type of research the type of data and the research process itself will necessarily be different but need not be any less valid. Problems do exist for selecting criteria for measuring or determining the success of early intervention. The following factors can be considered essential in this regard:

(i) significant progress toward the acquisition of developmental and cognitive milestones (walking, talking).

(ii) development of appropriate social behaviour.

(iii) increased family involvement with the child's intellectual programming.

This study described a comprehensive intervention programme which utilised a specific population of D.S. infants for a two year period. Replicability of the study should always be possible provided the skills of those constituting the professional component in this programme can be substituted, and the role and status of the researcher clearly identified.

It would seem important that ecologically based intervention research be carried out in other New Zealand environments, including both rural and urban non-white populations. It is in the latter instance where the programme described in this study may require change. Research is necessary with larger samples to further document the effects of early intervention programmes and to isolate specific variables responsible for their success. Le Compte & Goetz (1982, p. 45) suggest that "such change may be recurrent, progressive, cyclic or aberrant; sources of change and their operation need to be specified". Further research should establish which data remain stable over time and which data

are subject to change.

Particular emphasis should be placed on inter-disciplinary enquiry within child development. No single discipline can possibly capture the myriad influences that determine the course of development. "No one discipline can provide the ultimate truth concerning all basic developmental principles" (Tjossem, 1976, p. 181). It is further suggested by Tjossem (1976, p. 182) that "problem areas needing a longitudinal research approach require an organisational or group effort, not only because of the scope of the work, but also because of the need for diversity of talents, skills and knowledge that cannot be found in a single investigator".

Public and private funding agencies should provide support for research efforts on major conceptual issues which are longitudinal, ecological and interdisciplinary in scope, in addition to projects which arise in response to a perceived crisis such as the failure of handicapped children to benefit from the educational system. Funding agencies should allow and encourage the delivery of support services to children and families who are participating in longitudinal research projects. Evaluations should not only meet the needs of the scientific investigators but should also promote the development of the child and the integrity of his/her family. This may mean the additional provision of such services as health care, parent training, day care and social services.

If we accept that parents are the focus of intervention then we need to know much more about parents. If the primary emphasis is on teaching the mothers/fathers about the techniques of psychological enrichment and then relying essentially on the types of interactions which take place in the home, then the parent is the most critical therapeutic change agent. Parents are as variable as infants and we need to know more about them.

As the handicapped child's network grows and comes to include peers and other adults it should receive extensive research attention. Father-infant interaction systems should also be studied. Answers to questions concerning how D.S. children in intervention cope with pre-school experiences should be sought. Are they better able to follow instructions at school? Are they more task oriented? What is the effect of intervention on mother-infant interaction?

This study clearly showed that parents can be helped to maximise their child's development. A great deal can be done to alter the formerly dismal prognosis of patients with D.S. Infants need to be referred for intervention in the neonatal period. As these children develop physicians, psychologists and educators need to join together to aid parents in their task.

It is as well to remember that the objectives of society and of educational systems are not merely intellectual. Powerful and important human development also

occurs outside the cognitive domain.

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APPENDIX A

DOWN'S SYNDROME PERFORMANCE INVENTORY

Level 1 - Developmental Age Range Birth to 18 Months

1 Gross Motor

A. 0 - 6 Months

1. Prone and Supine Positions

1 a. Rotates head to side (prone)
2 b. Lifts head momentarily (prone)
3 c. Lifts head momentarily (supine)
4 d. Lifts head up 45° (prone)
5 e. Lifts head up 90° (prone)
6 f. Supports weight on forearms, lifts chest and head
7 g. Lifts head 45° when suspended (prone)
8 h. Holds head steady when brought to sitting from supine position with back support

9 2. Pulls self to sit with no head lag

3. Sitting Position

10 a. Sits with much support
11 b. Sits self supported

4. Turning

12 a. Turns side to back
13 b. Turns back to side

5. Standing Position

14 a. Bears weight on feet
15 b. Lifts foot

B. 6 - 12 Months

1. Prone Position

16 a. Holds self up on extended arms
17 b. Pivots
18 c. Pulls self forward

19 2. Protective Extension - Front

20 3. Rolls Over Stomach to Back

21 4. Rolls Over Back to Stomach

22 5. Creeps 5 + feet

6. Sitting Position

23 a. Sits alone steadily for 30 + seconds
24 b. Sits alone and uses hands in other activities
25 c. Sits alone and reaches with hands
26 d. Protective extension sides
27 e. Righting reactions front and back
28 f. Gets to prone from sitting position

7. Crawling Position

29 a. Maintains self in crawling position
30 b. Gets to sitting from crawling position
31 c. Gets into crawl position
32 d. Reaches in crawl position
33 e. Wheel barrow
34 f. Crawls alone 5 + feet

B. Standing Position

35 a. Stands holding on
36 b. Rotates trunk when standing
37 c. Straightens legs to stand
38 d. Pulls self to standing position
39 e. Stands alone momentarily
40 f. Cruises left
41 g. Cruises right
42 h. Walks when led with two hands

C. 12 - 18 Months

1. Balance and Locomotion Skills

43 a. Crawls over low barriers
44 b. Creeps
45 c. Kneels without support
46 d. Cruises over low object left
47 e. Cruises over low object right
48 f. Climbs two steps on hands and knees
49 g. Gets self seated on small chair
50 h. Gets to standing unaided
51 i. Walks with one hand held
52 j. Stands and walks several steps alone
53 k. Walks unaided
54 l. Walks fast
55 m. Walks sideways four steps
56 n. Walks backwards four steps

2. Strength Skills

57 a. Carries an object weighing three pounds 5 + feet

3. Ball Skills

58 a. Rolls ball 10 + feet
59 b. Hits ball on floor with hand

DOWNS SYNDROME PERFORMANCE INVENTORY

Level 1 - Developmental Age Range Birth to 18 Months

11 Fine Motor - Eye Hand Co-Ordination

A. 0 - 6 Months

1 a. Fixates on object
2 b. Follows object to midline, lying down
3 c. Follows object 180° lying down
3 d. Follows object 180° in sitting position
5 e. Brings hands together
6 f. Grasps objects
7 g. Looks at small object on table
8 h. Reaches for object lying down
9 i. Reaches for object in sitting position
10 j. Rakes and attains small object on table
11 k. Holds two small objects - one in each hand

B. 6 - 12 Months

12 a. Transfers objects hand to hand
13 b. Reaches for and obtains objects consistently
14 c. Picks up two objects - one with each hand
15 d. Bangs two blocks or objects together
16 e. Points to pictures in book
17 f. Picks up objects using thumb - finger grasp

C. 12 - 18 Months

18 a. Picks up small objects using neat pincer grasp
19 b. Takes objects out of containers
20 c. Puts objects in containers
21 d. Holds crayon
22 e. Scribbles spontaneously
23 f. Makes a tower of two blocks
24 g. Puts 3 - 5 rings on a stick
25 h. Puts 3 - 5 large pegs into small can
26 i. Puts 3 - 5 large round pegs in pegboard
27 j. Puts circle into formboard 1:1
28 k. Puts square into formboard 1:1
29 l. Puts triangle into formboard 1:1

DOWNS SYNDROME PERFORMANCE INVENTORY

Level 1 - Developmental Age Range Birth to 18 Months

111 Cognitive

A. 0 - 6 Months

1 a. Looks for dropped object

B. 6 - 12 Months

2 a. Removes blanket to find hidden toy
3 b. Imitates motor response
4 c. Opens box to find object

C. 12 - 18 Months

5 a. Dumps raisin from bottle (no model)
b. Given an object in each hand, child solves problem of what to do when presented with a third object (e.g. transfers object to hold two in one hand and picks up third object with free hand)

DOWN'S SYNDROME PERFORMANCE INVENTORY

Level 1 - Developmental Age Range Birth to 18 Months

IV Language

A. Receptive

1. 0 - 6 Months

1 a. Responds to Sound
2 b. Turns to sound
3 c. Turns to a voice

2. 6 - 12 Months

a. Responds to:

4 1. Own name
5 2. Look
6 3. No

3. 12 - 18 Months

7 a. Gives toy on request (with gesture)
8 b. Indicates one named body part on cue
9 c. Responds to simple commands, e.g. come, stop, etc.

B. Expressive

1. 0 - 6 Months

10 a. Makes some sounds
11 b. Laughs out loud
12 c. Vocalises with 2 vowel sounds in isolation
13 d. Vocalises with 2 consonant sounds
14 e. Vocalises for wants and needs

2. 6 - 12 Months

15 a. Says dada or mama non-specifically
b. Imitates speech sounds:

16 1. ah
17 2. oo
18 3. ee
19 4. dada
20 5. mama
21 6. baba

22 c. Says dada or mama specifically
23 d. Shows objects to others and vocalises

3. 12 - 18 Months

24 a. Makes consistent verbalisations for 3 objects
25 b. Uses single words
26 c. Uses a general noun to name objects in a category, e.g. "food" for things to eat
27 d. Points to objects and makes questioning sounds, e.g. "eh?"
28 e. Responds to adult verbalisation with vowel-consonant combinations and/or single words
29 f. Imitates single words, e.g. bus, juice, cracker, cup etc.

DOWN'S SYNDROME PERFORMANCE INVENTORY

Level 1 - Developmental Age Range Birth to 18 Months

V Social Self-Help

A. Social

1. 0 - 6 Months

1 a. Looks at faces
2 b. Smiles responsively
3 c. Smiles spontaneously

2. 6 - 12 Months

4 a. Holds arms out to be picked up (in response)
5 b. Resists toy pull
6 c. Works for toy out of reach
7 d. Plays peek-a-boo
8 e. Plays pat-a-cake
9 f. Plays ball

3. 12 - 18 Months

10 a. Imitates housework
11 b. Plays with 2 or 3 simple toys appropriately

B. Self Help

1. 6 - 12 Months

12 a. Feeds self finger food

2. 12 - 18 Months

13 a. Drinks from a cup
14 b. Uses spoon, spilling little
15 c. Eats foods of 3 different textures,
e.g. crunchy, chewy, lumpy
16 d. Removes one garment

APPENDIX A

INTERVENTION GROUP DEVELOPMENTAL PROGRESS (WEEKS)

N = 11

1. GROSS MOTOR	A	B	C	E	F	G	I	J	K	L	M
Lifts head prone	8	3	4	4	8	6	4	2	6	4	6
Lifts head supine	12	5	8	4	12	10	8	4	16	6	6
Stomach-chest-arm support	12	16	16	11	16	20	8	8	18	12	6
Sits - head steady	12	8	10	4	12	12	12	4	18	6	6
Rolls over	12	18	21	17	30	16	15	32	16	30	28
Bears weight on feet	12	10	16	17	30	12	5	3	16	6	16
Pulls to sit-no head lag	12	6	8	4	12	12	8	4	18	10	16
Sits self supported	20	22	36	24	28	36	22	16	18	25	24
Protective extension sides	44	34	38	28	28	44	25	34	36	34	30
Maintains self in crawling position	33	28	52	30	30	52	36	39	56	38	36
Sits alone	25	32	38	34	30	40	25	32	24	34	24
Gets in crawling position	76	28	60	56	32	56	30	30	56	52	52
Reaches in crawling position	17	29	40	24	52	56	34	36	52	53	52
Wheelbarrow	30	30	42	34	28	52	52	32	122	38	36
Gets to sitting	52	38	62	60	38	40	45	35	56	53	56
Balance reactions	30	30	80	34	52	40	56	36	36	50	48
Straightens legs to stand	17	16	16	20	28	44	42	34	20	24	38
Stands holding on	29	38	52	44	50	48	42	30	30	96	36
Trunk rotations	30	40	62	46	56	62	43	32	60	96	36
Pulls self to stand	52	51	80	46	72	64	26	52	60	82	56
Crawls alone	30	50	84	64	56	62	36	36	60	92	56
Cruises left	40	72	72	80	72	64	51	56	52	100	68
Cruises right	40	72	72	80	72	64	51	56	52	100	68
Walks hand held	72	80	80	84	80	64	60	56	64	116	68
Walks unaided	104	88	104	96	84	68	76	96	80	120	84

2. FINE MOTOR ADAPTIVE	A	B	C	E	F	G	I	J	K	L	M
Fixates on Object	8	3	4	4	2	6	2	2	6	6	8
Follows object 180° lying down	8	4	5	8	13	24	13	3	12	9	14
Follows object 180° sitting up	12	6	6	4	20	24	20	8	12	12	14
Brings hands together	12	8	14	10	20	24	20	14	12	20	14
Grasps	12	8	14	15	12	24	12	4	10	15	12
Regards small object on table	17	16	16	20	20	24	20	13	12	12	14
Reaches lying down	12	6	8	20	28	24	28	13	8	24	20
Reaches sitting up	22	29	20	18	28	24	28	20	18	25	25
Looks for dropped object	30	28	30	17	28	40	28	26	34	25	40
Rakes and obtains small object on table	28	32	36	34	28	40	28	25	19	26	30
Holds two objects	30	32	36	20	32	40	32	11	18	22	28
Transfers objects	28	29	36	20	32	40	29	15	21	26	36
Picks up two blocks	30	33	37	20	32	40	33	22	23	30	34
Bangs together	30	39	40	20	32	40	52	40	32	32	36
Points to pictures in book	64	60	58	54	52	62	33	26	28	30	40
Thumb-finger grasp	44	48	40	54	48	56	48	34	28	30	36
Pincer grasp	40	40	41	34	48	56	40	36	36	36	56
Takes objects out of container and drops	45	30	41	34	32	56	46	36	28	37	38
Rings on a stick - take	45	40	42	55	56	56	34	32	72	38	72
Rings on a stick - put	48	40	42	84	56	56	45	80	72	80	80
Rings on a stick - release	46	44	42	88	56	80	45	80	72	80	80
Peg in a can - take	41	41	39	34	50	56	46	42	68	38	72
Peg in a can - put	68	41	41	34	50	56	46	40	68	80	72
Peg in a can - release	68	42	62	30	72	56	48	68	68	80	72
Peg in a hole (large)- take	64	50	60	34	50	56	34	32	80	80	80
Peg in a hole (large)- put	68	52	96	34	72	56	48	80	80	80	100
Peg in a hole (large)- release	68	58	64	40	72	56	48	80	80	80	100
Circle in circle 1:1 take	45	54	42	42	50	72	52	32	72	38	80
Circle in circle 1:1 put	48	58	42	42	72	72	66	80	72	80	80
Circle in circle 1:1 release	46	58	42	45	72	100	66	80	72	80	84
Square in square 1:1 take	45	54	42	50	50	72	52	32	72	38	76
Square in square 1:1 put	48	58	42	51	60	72	66	80	72	92	76
Square in square 1:1 release	46	58	42	51	72	72	66	80	72	92	88

	A	B	C	E	F	G	I	J	K	L	M
Triangle in triangle 1:1 take	45	54	42	55	50	72	66	32	68	38	80
Triangle in triangle 1:1 put	48	58	42	55	72	72	66	80	68	92	84
Triangle in triangle 1:1 release	46	58	42	54	72	72	66	80	68	92	96
Holds crayon	68	60	62	40	50	64	52	45	32	36	42
Scribbles	74	68	63	88	56	68	53	50	40	52	64
Makes tower of two cubes	69	97	64	84	56	60	76	80	72	94	76
Dumps raisin from bottle - "modelled"	62	60	62	50	58	30	44	25	43	32	52
Dumps raisin from bottle - spontaneously	64	62	64	51	72	39	45	25	43	38	55
3. LANGUAGE (Receptive)											
Turns to sound	8	4	5	4	2	5	4	3	15	10	4
Turns to voice	8	5	5	4	2	8	12	16	15	10	8
Responds to look	30	30	30	34	30	30	26	36	30	18	38
Responds to take	64	52	64	42	58	55	48	36	72	58	60
Responds to put	64	52	62	71	72	62	50	68	60	18	60
Responds to give	52	42	62	71	72	62	50	60	60	21	60
Points to one named body part	76	64	60	62	72	60	64	60	64	64	60
LANGUAGE (Expressive)											
Makes some sounds	8	6	6	2	20	9	12	8	12	9	7
Laughs	17	8	14	20	12	13	12	10	19	10	10
Dada or mama non-specific	40	32	24	50	24	33	32	32	28	36	32
Imitates speech sounds - dada	30	34	31	34	28	32	50	30	28	28	36
mama	64	60	28	50	29	42	45	35	40	36	38
baba	35	34	28	51	29	35	45	30	32	36	36
ee	60	52	36	72	52	56	36	72	52	34	32
oo	60	76	36	72	52	60	40	72	52	34	32
ah	64	76	36	72	52	60	40	72	56	34	32
Dada or mama specific	52	52	64	96	65	64	52	65	56	72	80
Says three other words	76	88	84	72	72	62	48	72	64	84	68

4. PERSONAL - SOCIAL	A	B	C	E	F	G	I	J	K	L	M
Regards face	8	3	4	4	2	4	5	3	4	2	4
Smiles responsively	6	6	6	10	7	8	8	4	15	8	8
Smiles spontaneously	8	7	7	8	5	9	10	12	17	9	10
Resists toy pull	17	18	12	15	24	17	12	16	12	25	24
Works for toy out of reach	30	20	32	21	24	24	24	10	24	25	38
Feeds self cracker	26	28	30	20	24	29	27	34	34	27	40
Plays peek-a-boo	49	38	40	34	50	37	26	32	28	33	40
Plays pat-a-cake	58	62	52	40	56	46	42	30	38	49	42
Plays ball	68	60	62	56	52	50	48	34	28	32	42
Drinks from a cup	52	52	60	34	52	50	53	36	69	56	48
Imitates housework	78	60	64	80	52	64	54	60	64	72	60
Uses spoon	50	60	60	34	30	55	53	96	68	28	72
Removes garment	68	51	52	34	52	47	44	30	36	36	72

APPENDIX B

Items use for encouraging affective development in Down's Syndrome Infants. (From Cicchetti & Sroufe, 1976).

INSTRUCTIONS FOR INDIVIDUAL ITEMS

Specific Instructions*

AUDITORY:

1. Four pops in a row, then pause. Starts with lips pursed, cheeks full.
2. Say "Aah", starting low, then crescendoing to a loud voice, with an abrupt cutoff; 6-sec pause.
3. Using a loud deep voice, pronounce "BOOM, BOOM, BOOM," at 1-sec intervals.
4. With a mechanical type of sound, varying voice pitch from low to high and back down again, say, "Boo-Boo-Boo-Baa-Baa-Baa-Boo-Boo-Boo."
5. With mouth 1 foot from bay's ear, whisper "Hi, baby, how are you?" Avoid blowing in ear.
6. Falsetto voice (like Mickey Mouse), say, "Hi, baby, how are you?"
7. With lips relaxed, blow through them as a horse does when he is tired.

TACTILE:

8. Blow gently at hair for 3 sec. Blow from side, across top of baby's head.
9. Four quick pecks on bare stomach.
10. Gently stroke cheek three times with soft object.
11. Place baby on knee facing away. Five vigorous bounces.
12. Hold baby waist high, horizontal, face toward floor, and jiggle vigorously for 3 sec.
13. Using finger, gently tickle under baby's chin for 3 sec.
14. Open mouth wide, press lips on back of neck and create suction for 2 sec. Minimize auditory aspects.
15. Lift baby slowly to position overhead, looking down back.

SOCIAL

16. Allowing baby to grasp yarn, then tug three times trying not to pull it away from infant. Pause to repeat. (Place yarn in baby's hand if this is necessary.)

17. Put cloth in mouth and lean close enough for baby to grasp. Allow baby to pull cloth out and replace it if this is its tendency. (Place end of cloth in baby's hand if this is necessary.)

18. Say lyrically, "I'm gonna get you" ("I'm" quite protracted), while leaning toward baby with hands poised to grab. Then grab baby around stomach. If laughter is achieved, do other trials not followed by grabbing.

19. Stand at baby's side. Cover baby's face with cloth. If baby does not uncover his face immediately, uncover for him/her. Do not drag cloth across baby's face. Emphasis is on baby getting out from underneath.

20. Stick out tongue until baby touches it. (Make the infant's hand touch if it necessary.) Quickly pull tongue back in as soon as baby touches it.

21. Using blank cardboard, get baby's attention with face uncovered, cover face for 2 sec., uncover quickly and pause 3 sec. Do not say, "peek-a-boo".

VISUAL

22. Focus baby's attention on your fingers. Walk fingers toward baby, then give baby a poke in the ribs. If laughter is achieved, do other trials not followed by poking.

23. Using a white cloth, proceed as in No. 29 below.

24. Use one of baby's favourite toys. Focus baby's attention on it (out of reach). Cover it for 2 sec., uncover quickly.

25. First make sure that baby is not hungry, then take bottle, bring towards lips, take three pretend sucks, lower bottle. Minimize noise of sucks.

26. Place baby in high chair or infant seat. Crawl across baby's field of vision, not toward baby. Stand, return to starting point.

27. Stand with arms extended to sides, walk in an exaggerated waddle, across baby's field of vision. Return to starting point walking normally.

28. Shake head vigorously at a distance of 1 foot from baby's face three times. Do not allow hair to touch baby.

29. Obtain baby's attention. Hold human mask up so baby can see it. Place mask in front of your face, lean slowly to within 1 foot of baby's face, pause 2 sec. Lean back slowly, remove mask slowly.

30. To reduce peek-a-boo effects, move baby slowly in front of full-length mirror. Hold for 3 sec., remove slowly, then pause 4 sec.

* Pauses between trials are 4 sec. unless otherwise noted.

All items are presented to the infant by the mother.

APPENDIX C

HOME INVENTORY (BIRTH TO THREE)

Name: _____ Date of Interview: _____

Child's birthdate: _____ Interviewer: _____

Relationship of person interviewed to child: _____ Place of Interview: _____

Daily Composition: _____
(indicate persons living in household including sex and age of children)

Persons present in the home at time of interview: _____

Comments: _____

_____

STANINES (N = 124)

	1	2	3	4	5	6	7	8	9	MEAN	S.D.
I	1-3	4	5-6	7	8	9	10	11	-	7.8	2.3
II	1-2	3	4	5	-	6	7	8	-	5.5	1.5
III	1-2	3	-	4	5	-	6	-	-	4.8	1.2
IV	1	2	3-4	5	6	7	8-9	-	-	6.1	2.5
V	-	1	2	-	3	4	5	6	-	3.4	1.7
VI	-	1	-	2	3	-	4	5	-	2.8	1.3
TOTAL	20	20-21	22-24	25-28	29-32	33-36	37-40	41-43	44-45	30.4	7.7

	FACTOR	RAW SCORE	STANINE
I	Emotional and verbal Responsivity of Mother	10	7
II	Avoidance of restriction and punishment	7	7
III	Organisation of environment	6	7
IV	Provision of appropriate play materials	9	7
V	Maternal involvement with the child	6	8
VI	Opportunities for variety in daily routine	5	8
TOTAL		43	8

I	EMOTIONAL AND VERBAL RESPONSIVITY OF MOTHER	YES	NO
1.	Mother spontaneously vocalises to child at least twice during visit (excluding scolding)		
2.	Mother responds to child's vocalisations with a verbal response		
3.	Mother tells child the name of some object during visit or says name of person or object in a "teaching style"		
4.	Mother's speech is distinct clear and audible		
5.	Mother initiates verbal interchanges with observer -- asks questions makes spontaneous comments		
6.	Mother expresses ideas freely and easily and uses statements of appropriate length for conversation (e.g. gives more than brief answers)		
7.	Mother permits child occasionally to engage in "messy" types of play		
8.	Mother spontaneously praises child's qualities or behaviour twice during visit		
9.	When speaking of or to child mother's voice conveys positive feeling		
10.	Mother caresses or kisses child at least once during visit		

11. Mother shows some positive emotional responses to praise of child offered by visitor

SUB SCORE

II	AVOIDANCE OF RESTRICTION AND PUNISHMENT	YES	NO
12.	Mother does not shout at child during visit		
13.	Mother does not express overt annoyance with or hostility toward child		
14.	Mother neithers slaps nor spanks child during visit		
15.	Mother reports that no more than one instance of physical punishment occurred during the past week		
16.	Mother does not scold or derogate child during visit		
17.	Mother does not interfere with child's actions or restrict child's movements more than 3 times during visit		
18.	At least 10 books are present and visible		
19.	Family has a pet		

SUB SCORE

III	ORGANISATION OF PHYSICAL AND TEMPORAL ENVIRONMENT	YES	NO
20.	When mother is away care is provided by one of 3 regular substitutes		
21.	Someone takes child into grocery store at least once a week		
22.	Child gets out of house at least 4 times a week		
23.	Child is taken regularly to doctor's office or clinic		
24.	Child has a special place in which to keep his toys and "treasures"		
25.	Child's play environment appears safe and free of hazards		

SUB SCORE

IV	PROVISION OF APPROPRIATE PLAY MATERIALS	YES	NO
26.	Child has some muscle activity toys or equipment		
27.	Child has push or pull toy		
28.	Child has a stroller or walker, kiddie car, scooter or tricycle		
29.	Mother provides toys or interesting activities for child during interview		
30.	Provides learning equipment appropriate to age - cuddly toy or role playing toys		
31.	Provides learning equipment appropriate to age - mobile table and chairs, high chair,play pen		
32.	Provides eye hand co-ordination toys - items to go in and out of receptacle, fit together toys,beads		
33.	Provides eye hand co-ordination toys that permit combinations - stacking or nesting toys, blocks or building toys		
34.	Provides toys for literature and music		

SUB SCORE _____

V	MATERNAL INVOLVMENT WITH CHILD	YES	NO
35.	Mother tends to keep child within visual range and to look at him often		
36.	Mother "talks" to child while doing her work		
37.	Mother consciously encourages developmental advance		
38.	Mother invests "maturing toys" with value via her attention		
39.	Mother structures child's play periods		
40.	Mother provides toys that challenge the child to develop new skills		

SUB SCORE _____

VI	OPPORTUNITIES FOR VARIETY IN DAILY STIMULATION	YES	NO
41.	Father provides some caretaking every day		
42.	Mother reads stories at least 3 times weekly		
43.	Child eats at least one meal per day with mother and father		
44.	Family visits or receives visits from relatives		
45.	Child has 3 or more books of his own		

SUB SCORE _____

APPENDIX C

H.O.M.E. INVENTORY :

Scores of Intervention and Contrast Groups

INTERVENTION GROUP	A	B	C	E	F	G	I	J	K	L	M
1. Emotional and Verbal Responsivity of Mother	9	10	9	9	7	11	10	10	11	10	10
2. Avoidance of Restriction and Punishment	6	7	7	7	6	8	8	8	7	7	7
3. Organisation of Physical and Temporal Environment	6	6	6	6	6	4	6	5	6	6	5
4. Provision of Appropriate Play Materials	9	9	9	9	9	9	9	9	9	9	9
5. Maternal Involvement with Child	6	6	6	6	5	6	6	6	6	6	6
6. Opportunities for Variety in Daily Routine	5	5	4	5	5	4	5	5	4	4	5
TOTAL	41	43	41	42	38	42	44	43	43	42	42

CONTRAST GROUP	1	3	6	7
1. Emotional and Verbal Responsivity of Mother	11	11	11	10
2. Avoidance of Restriction and Punishment	7	8	7	6
3. Organisation of Physical and Temporal Environment	6	6	6	6
4. Provision of Appropriate Play Materials	9	8	9	8
5. Maternal Involvement with Child	6	6	6	5
6. Opportunities for Variety in Daily Routine	5	3	5	3
TOTAL	44	42	44	38

APPENDIX D

A.B.C. SCALE

LANGUAGE FACILITATION

Elicits vocalisation (through imitation and contingent responses)

Converses, chants to infant

Praises or encourages child

Offers help or solicitious remarks

Inquiries of child; requests

Gives explanation, information or culture rules

Labels sensory experiences

Reads to or shows pictures

Sings to or plays music for

SOCIAL -EMOTIONAL POSITIVE INPUTS

Smiles at child

Uses loving or reassuring tones

Provides physical loving contact

Plays social games with child

Uses eye contact to arouse, orient or sustain child's attention

SOCIAL -EMOTIONAL NEGATIVE INPUTS

Criticizes verbally; scolds; forbids; negative commands

Acts angry; is physically impatient, frowns, restrains child physically

Punishes physically

Isolates child (as behaviour modification technique)

Ignores child when child shows need for attention

PRESENTATION OF PIAGETIAN TASKS & OPPORTUNITIES FOR SENSORIMOTOR DEVELOPMENT

Object permanence

Means and Ends

Imitation

Causality

Prehension

Space

New Schemas

CAREGIVING ROUTINE WITH CHILD

Feeds

Diapers; Toilets

Dresses; Undresses

Washes; Cleans

Prepares child for sleep

Physical shepherding

Eye checks on child's wellbeing

CAREGIVING ROUTINES; WITH ENVIRONMENT

Prepares food

Tidies room or environment

Helps other caregivers

PHYSICAL DEVELOPMENT

Provides kinesthetic stimulation

Provides large-muscle play

DOES NOTHING

APPENDIX D

A.B.C. CAREGIVER SCALE:

% Scores of Intervention and Contrast Groups

INTERVENTION GROUP		A	B	C	E	F	G	I	J	K	L	M
Language Facilitation												
I	1	20	13.3	26.6	66.6	33.3	13.3	46.6	6.6	6.6	0	13.3
	2	86.6	100	73.3	100	100	89	86.6	73.3	100	86.6	100
	3	33.3	60	46.6	86.6	86.6	66.6	13.3	53.3	53.3	60	73.3
	4	33.3	66.6	53.3	40	46.6	53.3	33.3	80	40	53.3	20
	5	60	60	53.3	100	100	13.3	60	20	60	26.6	66.6
	6	20	80	33.3	93.3	73.3	40	6.6	13.3	13.3	0	40
	7	26.6	6.6	0	0	6.6	0	0	6.6	0	6.6	0
	8	20	13.3	6.6	53.3	20	0	33.3	13.3	20	13.3	20
	9	0	0	0	0	0	6.6	0	0	0	0	0
Social Emotional Positive Inputs												
II	1	100	66.6	100	100	60	93.3	66.6	86.6	80	86.6	86.6
	2	93.3	100	86.6	100	93.3	66.6	93.3	93.3	100	86.6	100
	3	46.6	33.3	20	60	13.3	46.6	13.3	33.3	26.6	60	6.6
	4	53.3	60	60	46.6	20	20	40	40	20	13.3	20
	5	46.6	33.3	40	40	33.3	26.6	33.3	60	13.3	46.6	13.3
Social Emotional Negative Inputs												
III	1	0	6.6	0	0	0	6.6	6.6	0	0	0	0
	2	6.6	0	13.3	13.3	13.3	0	13.3	13.3	20	0	13.3
	3	0	6.6	0	0	0	6.6	0	0	0	0	0
	4	0	0	0	0	0	0	0	0	0	0	0
	5	0	0	0	0	0	0	0	0	0	0	0
	6	0	0	0	0	0	0	0	0	0	0	0

		A	B	C	E	F	G	I	J	K	L	M
Presentation of Piagetian Tasks and Opportunities for Sensorimotor Development												
IV	1	26.6	33.3	33.3	20	66.6	33.3	26.6	40	13.3	13.3	20
	2	13.3	40	20	33.3	66.6	6.6	6.6	20	13.3	6.6	20
	3	66.6	66.6	53.3	20	13.3	33.3	20	60	33.3	20	6.6
	4	0	26.6	0	6.6	0	6.6	0	6.6	0	0	0
	5	20	6.6	13.3	0	0	6.6	6.6	6.6	6.6	33.3	0
	6	20	20	26.6	20	66.6	26.6	20	40	20	13.3	20
	7	6.6	13.3	0	0	0	20	6.6	13.3	6.6	6.6	6.6
Caregiving Routines with Child												
V	1	6.6	26.6	0	0	0	0	13.3	0	20	6.6	0
	2	0	0	0	0	0	0	0	0	0	0	0
	3	0	0	0	0	0	0	0	0	0	0	0
	4	0	6.6	0	0	0	0	0	0	13.3	0	0
	5	0	0	0	0	0	0	0	0	0	0	0
	6	6.6	6.6	6.6	0	0	0	6.6	20	20	33.3	0
	7	13.3	40	73.3	13.3	0	66.6	0	86.6	46.6	53.3	0
Caregiving Routines with Environment												
VI	1	0	6.6	0	0	0	0	26.6	0	6.6	20	0
	2	0	0	0	0	0	0	0	6.6	6.6	0	0
	3	0	0	0	0	0	0	0	0	0	0	0
Physical Development												
VII	1	100	66.6	86.6	0	0	53.3	33.3	53.3	66.6	46.6	0
	2	33.3	20	13.3	0	0	46.6	6.6	20	20	40	0
Does Nothing												
VIII		13.3	20	53.3	20	13.3	33.3	66.6	40	60	60	73.3

APPENDIX D

A.B.C. CAREGIVER SCALE:

% Scores of Intervention and Contrast Groups

CONTRAST GROUP		1	3	6	7
Language Facilitation					
I	1	6.6	0	13.3	0
	2	93.3	80	66.6	93.3
	3	40.0	60	46.6	40
	4	40.0	33.3	26.6	20
	5	80	60	53.3	66.6
	6	26.6	13.3	6.6	33.3
	7	0	0	13.3	0
	8	6.6	0	6.6	20
	9	0	0	0	0
Social Emotional Positive Inputs					
II	1	80	0	46.6	26.6
	2	100	20	66.6	86.6
	3	13.3	60	33.3	53.3
	4	6.6	20	6.6	0
	5	6.6	0	0	0
Social Emotional Negative Inputs					
III	1	0	0	0	0
	2	0	0	13.3	6.6
	3	0	0	0	0
	4	0	0	0	0
	5	0	0	0	0
	6	0	0	0	6.6

		1	3	6	7
Presentation of Piagetian Tasks and Opportunities for Sensorimotor Development					
IV	1	0	0	13.3	0
	2	13.3	26.6	13.3	13.3
	3	13.3	20	13.3	13.3
	4	6.6	6.6	0	0
	5	0	0	0	0
	6	0	0	0	0
	7	0	0	0	0
Caregiving Routines with Child					
V	1	0	6.6	13.3	0
	2	0	0	0	6.6
	3	0	0	0	0
	4	0	6.6	6.6	0
	5	0	0	0	0
	6	0	0	0	0
	7	0	6.6	33.3	6.6
Caregiving Routines with Environment					
VI	1	6.6	6.6	13.3	6.6
	2	0	0	0	0
	3	0	0	0	0
Physical Development					
VII	1	0	0	0	0
	2	0	0	0	0
Does Nothing					
VIII		66.6	46.6	33.3	46.6

APPENDIX E

PARENT AS A TEACHER INVENTORY

Letter Accompanying Postal Questionnaire

Name of Person
Completing this Questionnaire
(please write your name clearly) _____

IMPORTANT NOTE

As with all other material in this study your response to this questionnaire is CONFIDENTIAL.

As soon as your completed form is returned this page, with your name, will be destroyed, for we use code numbers only when collecting results.

In this questionnaire, we would like you to tell us about your ideas for how children should be brought up. People often write in magazines or newspaper articles what they think about this, and often seem to disagree. So it is very important to find out what parents themselves think.

There are no "right" or "wrong" answers to these items, so please be quite frank. The questionnaire gives you a list of ideas other parents have contributed and you simply indicate whether you agree or disagree. You may find some of the statements rather extreme and will want to agree or disagree with them strongly. Other statements are not so strongly worded, and you will probably indicate mild agreement or disagreement. We do expect people to differ in their ideas, so do feel quite free to answer how you wish.

ID#_____

P A A T

Directions:

You will be reading some statements on feelings about your child. This is not a test. We are asking that you express your feelings about your child. For each statement, circle only one answer. If there is no doubt in your mind about a statement, then you will circle either STRONG YES or STRONG NO. Otherwise, circle either YES or NO. Continue until you have answered all 50 statements. Take your time.

1.	I get tired of all the demands my child makes.	Strong Yes	Yes	No	Strong No
2.	My child should be able to make noise during play.	Strong Yes	Yes	No	Strong No
3.	It is all right for my child to disagree with me.	Strong Yes	Yes	No	Strong No
4.	My child needs to play with me.	Strong Yes	Yes	No	Strong No
5.	Much of my child's learning will take place before he enters school.	Strong Yes	Yes	No	Strong No
6.	I like my child to play make believe games.	Strong Yes	Yes	No	Strong No
7.	It gets on my nerves when my child keeps asking me to watch him play.	Strong Yes	Yes	No	Strong No
8.	I want my child to say more than I do when we communicate.	Strong Yes	Yes	No	Strong No
9.	Playing with my child makes me feel restless.	Strong Yes	Yes	No	Strong No
10.	It is hard for me to tell when my child has learned something.	Strong Yes	Yes	No	Strong No
11.	When my child doesn't know an answer, I ask him to guess.	Strong Yes	Yes	No	Strong No
12.	I get tired of all the fears that my child expresses.	Strong Yes	Yes	No	Strong No

13. There are some demands I just don't want my child to make.	Strong Yes	Yes	No	Strong No
14. If I spend a lot of time playing with my child, he will disobey me more often.	Strong Yes	Yes	No	Strong No
15. It is all right for my child to have a make-believe friend.	Strong Yes	Yes	No	Strong No
16. I want my child to play with toys made for boys and with toys made for girls.	Strong Yes	Yes	No	Strong No
17. My child bothers me with demands when I am busy.	Strong Yes	Yes	No	Strong No
18. I like my child to be quiet when adults are talking.	Strong Yes	Yes	No	Strong No
19. I feel able to choose new toys for my child.	Strong Yes	Yes	No	Strong No
20. It is difficult for me to think of things to say to my child during play.	Strong Yes	Yes	No	Strong No
21. When my child plays with toys, the pretending seems foolish.	Strong Yes	Yes	No	Strong No
22. My child is punished for fighting during play.	Strong Yes	Yes	No	Strong No
23. While we play, my child should be the person in control.	Strong Yes	Yes	No	Strong No
24. Playing with my child improves the child's behaviour.	Strong Yes	Yes	No	Strong No
25. When I play with my child I feel the need to talk like a child.	Strong Yes	Yes	No	Strong No
26. I want my child to have all of his questions answered.	Strong Yes	Yes	No	Strong No
27. It's all right for my child to get dirty while at play.	Strong Yes	Yes	No	Strong No
28. When at play with my child, I prefer games that have rules rather than the make-believe kind of play.	Strong Yes	Yes	No	Strong No
29. My child learns new words when we play.	Strong Yes	Yes	No	Strong No

30. I feel able to give my child the proper preschool experience at home.	Strong Yes	Yes	No	Strong No
31. I get upset when my child tries to solve a simple problem in the wrong way.	Strong Yes	Yes	No	Strong No
32. It's okay for my child to interrupt me when we play.	Strong Yes	Yes	No	Strong No
33. I feel play must be stopped when my child becomes angry at a playmate.	Strong Yes	Yes	No	Strong No
34. I try to praise my child a lot when we play.	Strong Yes	Yes	No	Strong No
35. More of my child's personality learning at this age takes place by watching people and things rather than by being told.	Strong Yes	Yes	No	Strong No
36. It is all right for my child to spend a lot of time playing alone.	Strong Yes	Yes	No	Strong No
37. While at play my child can take out as many toys as he wishes.	Strong Yes	Yes	No	Strong No
38. I provide chances for my child to make up his own mind about a lot of things.	Strong Yes	Yes	No	Strong No
39. It is difficult for me to stay interested when playing with my child.	Strong Yes	Yes	No	Strong No
40. I scold my child when he doesn't learn.	Strong Yes	Yes	No	Strong No
41. My child wants to play too long at one time.	Strong Yes	Yes	No	Strong No
42. When my child shows off I ignore it.	Strong Yes	Yes	No	Strong No
43. I feel unhappy when I don't know the reason for my child's demands.	Strong Yes	Yes	No	Strong No
44. I imitate my child's speech when we play so that the child understands.	Strong Yes	Yes	No	Strong No
45. It is easy for me to use toys when teaching my child.	Strong Yes	Yes	No	Strong No

46.	I seldom tell my child his work is good or bad so that he can make up his own mind.	Strong Yes	Yes	No	Strong No
47.	I want my child to put the toys away before going to bed.	Strong Yes	Yes	No	Strong No
48.	It's all right for my child to have secrets from me.	Strong Yes	Yes	No	Strong No
49.	My child learns by playing with other children.	Strong Yes	Yes	No	Strong No
50.	If we play whenever my child wants to, not much learning will take place.	Strong Yes	Yes	No	Strong No

APPENDIX E

PARENT AS A TEACHER PROFILE

Parent _____

Child _____

School _____

* Explanation: The items on the Parent As A Teacher Scale (PAAT) have been restated to indicate feelings and beliefs that are seen as desirable for parent-child interaction, based on principles derived from child development. A score of one (1) indicates parents' self-perception is low in that area while a score of four (4) is high.

Creativity Analysis

	1	2	3	4
1. Child's questions encouraged.				
6. Likes child to make up stories.				
11. Encourages guessing.				
16. Toy selection not sexually biased.				
21. Child's pretending seems natural.				
26. Willing to express uncertainty in answering child's questions.				
31. Lets child experiment with problem solving.				
36. Child's playing alone acceptable.				
41. Accepts child need for long play periods.				
46. Lets child judge own work (refrains from judging).				

Control Analysis

	1	2	3	4
3. Child allowed to disagree with parent.				
8. Wants child to talk more than self.				
13. Child permitted to talk about any topic.				
18. Child may talk when adults are talking.				
23. Wants to share play dominance with child.				
28. Wants to honour child strength.				
33. Positive management of conflict (not stopping play).				
38. Child has chances to make decisions.				
43. Comfortable in not knowing all the answers to child's questions.				
48. Child permitted to have secrets from parents.				

Play Analysis

	1	2	3	4
4. Believes child needs to play with parent.				
9. Comfortable in playing with child.				
14. Believes child will respect parent who plays with him.				
19. Able to choose new toys.				
24. Believes playing with child improves child behaviour.				
29. Child learns new words when playing.				
34. Recognizes that the play process is rewarding.				

39. Can stay interested in playing with child.

44. Does not use child-like language.

49. Believes children learn by playing with other children.

Teaching Learning Analysis

	1	2	3	4
5. Believes much learning occurs before school.				
10. Can tell when child has learned.				
15. Accepts child's make-believe companions.				
20. Able to respond to child during play.				
25. Does not talk down to child but uses typical language.				
30. Feels capable of providing a learning environment at home.				
35. Believes child learning occurs more by observation than by being told.				
40. Child's learning failures not punished (scolding).				
45. Easily uses toys in teaching child.				
50. Believes playing with child increases child's learning.				

Frustration Analysis*

	1	2	3	4
2. Noise permitted during child's play.				
7. Responds favourably to child's call to observe play.				
12. Child allowed free expression of fears and anxieties.				
17. Child's questions accepted even when parent is busy.				

22. Fighting at play handled without punishment.

27. Child may get dirty at play.

32. Child may interrupt dyadic play.

37. Child can play with as many toys as he wishes.

42. Pays attention to child's showing off.

47. Respects child's play as work in process.

* A high score means that the parent handles the situation in a non-frustrating way whereas a low score on the item indicates a locus of possible frustation in parent-child interaction.

APPENDIX F

UZGIRIS & HUNT SCALES:

Assessment in Infancy

SAMPLE EXAMINATION RECORD FORMS

SCALE I : THE DEVELOPMENT OF VISUAL PURSUIT AND THE PERMANENCE OF OBJECTS

Name:

Birthdate:

Date of Examination:

SITUATION	PRESENTATION (Suggested number of presentations for each situation is indicated in parentheses) 1 2 3 4 5 6 7
1. Following a Slowly Moving Object through a 180° Arc (3-4)	
a. Does not follow object	
b. Follows jerkily through part of arc	
c. Follows smoothly through part of arc	
d.* Follows object smoothly through complete arc	
Other:	
2. Noticing the Disappearance of a Slowly Moving Object (3-4)	
a. Does not follow to point of disappearance	
b. Loses interest as soon as object disappears	
c.* Lingers with glance on point of disappearance	
d.* Returns glance to starting point after several presentations	
e. Searches around point of disappearance	
Other:	

* critical action

3. Finding an Object Which is Partially Covered (3)

a. Loses interest
b. Reacts to the loss, but does not obtain object
c.* Obtains the object

Other:

4. Finding an Object Which Is Completely Covered (3)

a. Loses interest
b. Reacts to loss, but does not obtain object
c. Pulls screen, but not enough to obtain object
d.* Pulls screen off and obtains object

Other:

5. Finding an Object Completely Covered in Two Places (2)

a. Loses interest
b. Searches for object where it was previously found
c. Searches for object where it was last hidden

Other:

6. Finding an Object Completely Covered in Two Places Alternately (3-5)

a. Becomes perplexed and loses interest
b. Searches haphazardly under one or both screens
c.* Searches correctly under each of the screens

Other:

7. Finding an Object Completely Covered in Three Places (5-7)

a. Loses interest
b. Searches haphazardly under some or all screens
C.* Searches directly under correct screens

Other:

8. Finding an Object after Successive Visible Displacements (3-5)

a. Does not follow successive hidings
b. Searches only under the first screen
c. Searches under screen where object was previously found
d. Searches haphazardly under all screens
e. Searches in order of hiding
f. Searches directly under the last screen in path

Other:

9. Finding an Object under Three Superimposed Screens (2-3)

a. Loses interest
b. Lifts one or two screens, but fails to find object
c.* Removes all screens and obtains object

Other:

10. Finding an Object Following One Invisible Displacement (3)

a. Loses interest
b. Reacts to loss, does not search
c. Searches only in the box
d.* Checks the box and searches under the screen
e.* Searches under screen directly

Other:

11. Finding an Object Following One Invisible Displacement with Two Screens (2)

a. Searches only in box
b. Searches under screen where object was previously found
c.* Searches directly under correct screen

Other:

12. Finding an Object Following One Invisible Displacement with Two Screens Alternated (3)

a. Loses interest
b. Searches haphazardly under screens
c.* Searches directly under correct screen

Other:

13. Finding an Object Following One Invisible Displacement with Three Screens (5-7)

a. Loses interest
b. Searches haphazardly under all screens
c.* Searches directly under correct screen

Other:

14. Finding an Object Following a Series of Invisible Displacements (4-6)

a. Searches only in E's hand
b. Searches only under first one or two screens in the path
c.* Searches under all screens in the path in the order of hiding
d.* Searches directly under the last screen in the path

15. Finding Object Following a Series of Invisible Displacements by Searching in Reverse of the Order of Hiding (2)

a. Searches only under last screen
b. Searches haphazardly under all screens
c.* Searches systematically from the last screen back to the first

Other:

SCALE II : THE DEVELOPMENT OF MEANS FOR OBTAINING DESIRED ENVIRONMENTAL EVENTS

Name:

Birthdate:

Date of Examination:

SITUATION	PRESENTATION (Suggested number of presentations for each situation are indicated in parentheses) 1	2	3	4

---

1. Appearance of Hand-Watching Behaviour (1); also Scale IV-1

a. Hand-watching is not observed
b. Hand-watching is observed

Comments:

2. Achievement of Visually Directed Grasping (3); also Scale V-3

a. Reaches for, but does not grasp object
b. Grasps object when both hand and object in view
c.* Grasps object by bringing hand up to object
d. Grasps object by shaping hand in anticipation of contact with object

Other:

3. Repetition of Actions Producing an Interesting Spectacle (2); also Scale IV-2

a. Shows interest
b. Intensifies arm movements and activates occasionally
c.* Repeats arm movements systematically and keeps toy active consistently
d. Only tries to grasp object

Other:

4. Letting Go of an Object in Order to Reach for Another (3)

a. Reaches for third object while holding the others
b. Reaches for third object with filled hands and drops one in the process of reaching
c.* Drops one of the objects prior to reaching for third

Other:

5. Use of Locmotion As Means (2)

a. No attempt to retrieve object, continues to play
b. Indicates desire for object, but does not try to retrieve it
c.* Moves to regain the object and resumes play using it

Other:

6. Use of the Relationship of Support (2)

a. Reaches for object on the support
b. Tries to get object by climbing
c. Appeals to another person to get the object
d.* Pulls the support after demonstration
e.* Pulls support without demonstration

Other:

7. Understanding of the Relationship of Support (1-2)

a. Pulls support expecting to obtain object
b. Pulls support, but reaches for object at same time
c.* Does not pull the support without the object on it

Other:

8. Use of String Horizontally (2)

a. Reaches for the object, ignoring string
b. Manipulates the string but does not pull it enough to get object
c.* Pulls string and gets object after demonstration
d.* Pulls string and gets object without demonstration

Other:

9. Use of String Vertically (2-3)

a. Indicates desire for object, ignoring the string
b. Drops string to floor and becomes unhappy
c. Plays with the string itself
d. Pulls the string, but not sufficiently to get the object
e.* Pulls string and obtains object after demonstration
f.* Pulls string and obtains object without demonstration

Other:

10. Use of Stick as Means (2)

a. Plays only with stick
b. Reaches for object, disregarding stick
c. Plays with stick and object, does not get object closer
d.* Uses stick to get object after demonstration
e.* Uses stick to get object without demonstration

Other:

11. Foresight in the Problem of the Necklace and the Container (2-3)

a. Does not try to put necklace into container
b. Attempts to put necklace in, but fails repeatedly
c. Succeeds in putting necklace in after several unsuccessful attempts
d. Invents a method which is successful after a failure
e.* Adopts a method which is successful from the first

Other:

12. Foresight in the Problem of the Solid Ring (2-3)

a. Does not stack rings
b. Uses force in trying to stack solid ring repeatedly
c. Attempts to stack solid ring once and avoids it subsequently
d.* Sets aside the solid ring without attempting to stack it

Other:

SCALE III : THE DEVELOPMENT OF IMITATION : VOCAL AND GESTURAL

Name:

Birthdate:

Date of Examination:

IIIA VOCAL IMITATION

SITUATION	PRESENTATION (Suggested number of presentations for each situation is indicated in parentheses) 1 2 3 4 5 6 7
1. Use of Vocalisation Other than Crying (1)	
a. Only vocalises distress sounds	
b.* Vocalises (coos) when not distressed	
Comments:	
2. Response to Familiar Vocalisations (2-3)	List vocalisations presented:
a. Shows no interest	
b. Listens, does not vocalise himself	
c.* Positive response to infantlike sounds	
d.* Vocalises in response to E's infantlike sounds	
e. Vocalises similar sounds, but does not shift to match E	
f. Vocalises similar sounds and shifts to match E	
Other:	
3. Response to Familiar Sound Patterns (2-3)	List vocalisations presented:
a. Shows no interest	
b. Listens, does not vocalise himself	
c.* Positive response to familiar sound patterns	
d.* Vocalises in response	
e. Vocalises similar sounds in response, but does not shift to match E	

f. Vocalises similar sound patterns and shifts to match E

4. Imitation of Familiar Words (2-3) — List vocalisations presented:

a. Listens, does not vocalise
b. Vocalises, but sounds fail to match models
c.* Imitates familiar words

Other:

5. Imitation of Unfamiliar Sound Patterns (2-3) — List vocalisations presented:

a. Shows unhappiness or cries
b. Shows no interest
c. Listens, does not vocalise himself
d.* Vocalises, but not similar sounds
e.* Vocalises with sounds becoming gradually closer approximations of models
f.* Vocalises with sounds similar to model's immediately

6. Imitation of New Words (6-7) — List words presented:

a. Listens, does not vocalise
b. Vocalises, but not similar sounds
c. Imitates by gradual approximation
d. Imitates a few words immediately
e.* Imitates most simple words immediately

Other:

IIIB GESTURAL IMITATION

SITUATION	PRESENTATION 1 2 3 4
	List actions presented:
1. Systematic Imitation of Familiar Simple Schemes (2-3)	
a. Shows interest, but no attempt to imitate	
b.* Peforms some action consistently, does not imitate	
c.* Imitates	
Other:	
2. Imitation of Complex Actions Composed of Familiar Schemes (2-3)	
a. Attends, but makes no attempt to imitate	
b. Performs some action consistently, does not imitate	
c.* Attempts to imitate, but does not approximate on successive attempts	
d.* Imitates by gradual approximation	
e.* Imitates model immediately	
Other:	
3. Imitation of Unfamiliar Gestures Visible to the Infant (2-3)	List gestures presented:
a. Shows interest, but no attempt to imitate	
b. Performs some action consistently, but does not imitate	
c. Imitates by gradual approximation	
d.* Imitates immediately	
Other:	
4. Imitation of Unfamiliar Gestures Invisible to the Infant (3-4)	
a. Shows interest, but no attempt to imitate	
b.* Performs some action consistently, does not imitate	
c. Imitates by gradual approximation	
d.* Imitates at least one invisible gesture immediately	
e.* Imitates most invisible gestures immediately	
Other:	

SCALE IV : THE DEVELOPMENT OF OPERATIONAL CAUSALITY

Name:

Birthdate:

Date of Examination:

SITUATION	PRESENTATION (Suggested number o presentations for each situation is indicated in parentheses) 1	2	3

1. Appearance of Hand-Watching Behaviour (1); also Scale II-1

a. Hand-watching is not observed
b. Hand-watching is observed

Comment:

2. Repetition of Actions Producing an Interesting Spectacle (2-3); also Scale II-3

a. Shows interest in object
d. Intensifies arm movements and activates occasionally
c.* Repeats arm movements systematically and keeps object active consistently
d. Only tries to grasp object

Other:

3. Use of Specific Action/ as "Procedure" (1-2)

a. Shows interest only during spectacle
b. Shows excitement, but no dominant act during pauses
c.* A dominant act during pauses suggests a "procedure"
d. Reaches for object only

Other:

4. Behaviour in a Familiar Game Situation (2-3)

a. Shows no interest
b. Remains passive during pauses
c. A dominant act during pauses suggests a "procedure"
d. Performs part of the act during pauses
e. Touches E and waits during pauses

Other:

5. Behaviour to a Spectacle Created by an Agent (1-2)

a. Shows interest only during spectacle
b. Shows excitement, but no dominant act during pauses
c.* A dominant act during pauses suggests a "procedure"
d.* Touches E and waits during pauses
e. Attempts to imitate E

Other:

6. Behaviour to a Spectacle Created by an Agent Acting on an Object (2-3)

a. Shows interest only during spectacle
b. A dominant act during pauses suggests a "procedure"
c.* Touches E or the object and waits
d.* Gives object back to E
e. Attempts to activate object

Other:

7. Behaviour to a Spectacle Created by a Mechanical Agent (1-2)

a. Plays with object only
b. Makes object perform its activity manually
c. Touches E or object and waits
d.* Gives object back to E
e.* Attempts to activate object mechanically after demonstration
f.* Attempts to discover a way to activate object mechanically before demonstration

Other:

SCALE V : THE CONSTRUCTION OF OBJECT RELATIONS IN SPACE

Name:

Birthdate:

Date of Examination:

SITUATION	PRESENTATION (Suggested number of presentations for each situation is indicated in parentheses) 1 2 3 4 6 7
1. Observing Two Objects Alternately (2-3)	
a. Looks at one object only	
b.* Alternates glance slowly between objects	
c.* Alternates glance rapidly between objects	
Other:	
2. Localising an Object by its Sound (5-7)	
a. Does not turn to sound	
b. Turns to sound in one direction only	
c. Turns to sound, does not locate its source	
d.* Localises the sources of sound visually	
Other:	
3. Grasping a Visually Presented Object (2-3); also Scale II-2	
a. Moves arms in the direction of object, does not touch it	
b. Clasps arms in front of the object	
c. Touches object, but fails to grasp it	
d.* Grasps object	
Other:	

4. Following the Trajectory of A Rapidly Moving Object (3-4)

a. Does not follow object, continues to look at E's hand
b. Follows some, but does not locate object
c.* Follows object and locates it visually only when it lands in view
d. Searches with the eyes for object when it lands out of view, but does not lean
e.* Leans to search for object in the direction where it must have landed

Other:

5. Recognising the Reverse Side of Objects (2-3)

a. Grasps object with no sign of appreciation of reversal
b. Withdraws hands and appears surprised at reversal
c.* Grasps object, but turns it around immediately or by comparing both sides indicates appreciation of reversal

Other:

6. Using the Relationship of the Container and the Contained (2-3)

a. Does not put objects in; only touches those inside
b. Takes objects out, does not put any in
c. Puts objects in and takes them out one by one
d.* Puts or drops objects in, reverses container to get them out

Other:

7. Placing Objects in Equilibrium One upon Another (2-3)

a. Does not try to build tower
b. Approximates two objects, but does not leave the second on the first

c.* Builds a tower of at least two objects

Other:

8. Appreciating Gravity in Play with Objects (2-3)

a. Does not attempt action
b. Acts without showing appreciation of gravity
c.* Acts with appreciation of the force of gravity

Other:

9. Exploring Fall of Dropped Object (1-2)

a. Does not systematically drop objects
b. Drops several objects repeatedly, does not look at where they land
c. Drops several objects repeatedly and looks to see where they land

Other:

10. Making Detours (2-3)

a. Loses interest in objects
b. Attempts to reach for the object using the same path as object
c. Goes directly around the barrier, thus making a detour

Other:

11. Indicating Absence of Familiar Persons (1)

a. Does not comprehend question
b. Goes to the usual location of the person
c.* Indicates knowledge of absence by gesture or word

Other:

SCALE VI : THE DEVELOPMENT OF SCHEMES FOR RELATING TO OBJECTS

Name:

Birthdate:

Date of Examination:

SCHEMES SHOWN	For example:	OBJECTS PRESENTED TO INFANT 1 Rattle	2 Doll	3 Plastic Fish	4 Foil	...15
a. Holding						
b.* Mouthing						
c.* Visual inspection						
d.* Simple motor schemes:						
1. Hits or pats with hand						
2. Hits surface with object						
3. Hits two together						
4. Shakes						
5. Waves						
Other:						
e.* Examining						
f.* Complex motor schemes:						
1. Slides						
2. Crumples						
3. Swings						
4. Tears or Stretches						
5. Rubs or pats						
Other:						
g.* "Letting go" actions:						
1. Drops						
2. Throws						
Other:						
h.* Socially instigated actions:						
1. Drinks						
2. Wears						
3. Drives						
4. Builds						
5. Hugs						
6. Dresses						
7. Sniffs						
8. Making "walk"						
Other:						
i.* Showing						
j.* Naming						
(List name used by infant)						

SAMPLE SUMMARY RECORD FORMS

These summary record forms list first, on the left, the scale steps by number. They list next the situation relevant to each step on the scale by the number associated with it in the directions for arranging the situations as well as in the examination record form. Third, they list the infant action critical for each numbered step by the letter associated with that action under the eliciting situation indicated by number for each scale step. Finally, there is a place to list the infant actions observed in each of the eliciting situations. These can be listed by means of the letters for the infant actions given under each eliciting situation. Once the infant actions observed in each of the eliciting situations are filled in, it is possible to determine at a glance the highest step in the scale achieved by the infant. Such a record form is quite adequate where the purpose of the investigation is to identify the level of each infant on each scale.

Scale VI is an exception to the description above, for the critical actions for the several steps are related to the objects presented rather than to the three eliciting situations. The critical actions for each scale are indicated by letter, except in the case of steps 3 and 4, where they are further specified by the number of the particular action listed under the grouping in the examination record forms, which are given in parentheses.

APPENDIX F

SCORES ON UZGIRIS AND HUNT:

Scales 1-5. Intervention and Contrast Groups.

SCALE I

	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL
Intervention													
A	3	2	2	2	2	2	2	5	2	3	1	2	28
B	3	4	2	3	2	2	2	5	2	3	2	1	30
C	3	2	2	3	2	2	2	5	2	3	-	2	28
E	3	3	2	3	2	2	2	5	2	-	-	2	26
F	3	3	2	3	2	2	2	5	2	2	-	-	26
G	3	4	2	3	-	-	-	3	2	3	-	2	22
I	3	4	2	3	2	2	2	4	2	3	1	2	30
J	3	4	2	2	2	2	2	-	1	-	-	-	18
K	3	2	2	3	2	2	2	3	2	3	1	1	26
L	3	2	2	3	2	2	2	2	2	3	-	-	23
M	3	2	2	3	2	2	2	-	2	3	-	1	22
Contrast													
1	3	2	2	3	2	2	2	4	2	4	2	-	28
3	3	2	2	3	2	2	2	5	2	-	-	-	23
6	3	2	2	3	2	2	2	5	2	1	-	-	24
7	3	2	2	3	2	2	2	5	2	-	-	-	23
Possible Total:													33

SCALE II

	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL
Intervention													
A	-	3	3	3	2	4	3	4	5	4	4	3	38
B	-	3	3	3	2	5	3	4	6	3	4	3	39
C	-	2	3	3	2	1	-	3	5	4	-	3	26
E	-	3	3	3	2	1	-	4	6	3	4	1	30
F	-	3	3	3	2	5	1	4	5	5	2	2	35
G	-	3	3	3	2	2	-	1	5	1	-	3	23
I	1	3	3	3	2	5	3	4	6	4	1	3	38
J	1	3	3	3	2	2	-	-	-	1	2	-	17
K	1	3	3	3	2	4	2	3	3	1	2	3	30
L	1	3	3	3	2	1	2	2	4	1	1	3	26
M	1	3	3	3	2	5	3	4	6	1	4	3	38
Contrast													
1	-	3	3	3	2	5	3	4	6	4	2	3	38
3	1	3	2	3	2	5	2	3	5	1	-	-	27
6	1	3	2	3	2	1	2	2	3	1	1	3	24
7	1	3	4	3	2	2	-	1	1	1	-	-	18
Possible Total:													44

SCALE III

	IIIA							IIIB				
	1	2	3	4	5	6	TOTAL	1	2	3	4	TOTAL
Intervention												
A	2	5	5	3	-	1	16	3	1	1	-	5
B	2	1	1	1	1	1	7	1	2	3	5	11
C	2	2	-	1	-	5	10	3	5	4	5	17
E	-	5	5	3	-	-	13	3	-	3	-	6
F	2	2	3	3	4	5	19	3	5	4	5	17
G	2	4	-	2	2	4	14	3	4	4	5	16
I	2	2	5	3	4	5	21	3	5	4	5	17
J	2	1	-	-	-	-	3	1	-	-	-	1
K	2	2	4	3	1	5	17	1	5	3	4	13
L	2	2	2	3	3	1	13	3	5	3	4	15
M	2	3	3	3	3	5	19	3	5	4	4	16
Contrast												
1	2	-	-	1	-	1	4	1	5	1	-	7
3	2	-	-	1	-	1	4	1	1	-	-	2
6	2	1	1	1	-	-	5	3	5	4	5	17
7	2	-	-	-	-	-	2	1	1	1	1	4

Possible Total: IIIA 24 IIIB 17

Total Score: 41

SCALE IV

	1	2	3	4	5	6	7	TOTAL
Intervention								
A	-	3	3	1	3	5	5	20
B	-	3	3	3	3	5	5	22
C	-	3	3	3	1	1	5	16
E	-	3	3	3	3	4	5	21
F	-	3	3	-	3	5	6	20
G	-	3	3	3	3	5	2	19
I	1	3	3	2	3	2	6	20
J	1	3	3	-	4	2	1	14
K	1	3	3	2	3	2	5	19
L	1	3	3	2	3	2	5	19
M	1	3	3	2	3	2	2	16
Contrast								
1	1	3	3	2	1	5	5	20
3	1	3	3	2	-	2	2	13
6	1	3	3	2	1	2	5	17
7	-	4	2	2	2	5	2	17
Possible Total:								29

SCALE V

	1	2	3	4	5	6	7	8	9	10	11	TOTAL
Intervention												
A	2	3	4	4	2	2	2	2	2	2	-	25
B	1	3	4	4	2	2	2	2	-	2	-	22
C	1	3	4	4	2	3	2	2	2	2	-	25
E	2	3	4	4	2	3	-	2	2	-	2	24
F	1	3	4	2	2	3	2	2	2	2	-	23
G	2	3	4	4	2	2	2	2	2	2	-	23
I	2	3	4	2	2	3	2	1	2	2	2	25
J	2	3	4	2	-	3	2	-	2	2	-	20
K	2	3	4	4	2	3	2	1	-	2	2	25
L	2	3	4	4	2	3	2	-	-	2	2	24
M	2	3	4	4	2	3	2	1	2	2	2	27
Contrast												
1	2	3	4	2	2	3	2	1	2	2	2	25
3	2	3	4	4	2	1	-	-	-	2	2	20
6	1	3	4	2	2	3	2	-	1	2	2	22
7	1	3	4	2	2	1	-	-	1	2	2	18
Possible Total:												28

APPENDIX G

Reference books loaned to parents:

"Let Me Play"

Jeffree D.M., McConkey R., Hewson S.
Human Horizons Series, 1978.

"Let Me Speak"

Jeffree D.M., and McConkey, R.
Human Horizons Series, 1978.

"Helping Your Handicapped Baby"

Cunningham C., and Sloper P.
Human Horizons Series, 1978.

"How to Raise a Brighter Child"

Beck J.
Fontana, 1967.

"The Child with Down's Syndrome"

Smith D.W., and Wilson A.A.
W.B. Saunders Company, 1973.

"Sharing Our Caring"

(P.O. Box 1961, Milton, Washington)
(Journals and Yearbooks 1973-1089)
- a magazine for parents and professionals interested in the Health and Welfare of persons with Down's Syndrome.

"Teaching Your Down's Syndrome Infant"

- a guide for parents

Hanson M.J.
University Park Press, 1977.

APPENDIX H

Visual Assessment (1 Year)

Visit I

Initial history of mother's pregnancy and delivery to ascertain children who may be at risk from forceps delivery or delayed passage through birth canal, or exposure to oxygen when premature. Family history of visual acuity.

Objective Assessment:

Examination of the fundus of the eye through the pupil for evidence of cataract. Observation of the eye for Nystagmus or unusual occular movement.

Subjective Assessment:

Children are asked to respond to the Allen picture cards; (telephone; house; car; birthday cake; teddy bear and horse) with either eye covered at a distance of 20 feet.

Visit II

Refraction and fundi are tested more fully under Atropine cyclolegia in the forms of drops placed in the eys of the infant in the days preceding this examination.

Visits I and II normally occur a week apart.

Auditory Assessment (9 months)

Distraction Testing:

Allows assessment of the hearing of any infant who is able to sit up unsupported. Audiologist distracts seated infant by way of an attractive toy. At the point attention is gained, the toy is removed from the infant's visual field and another audiologist presents a series of auditory stimuli (to right and left sides) to which the infant is required to respond by turning his head.

Impedance Testing:

Allows semi-objective (some co-operation required) assessment of the state of the middle ear cavity and reasonable assessment of the VIIIth nerve integrity as high as the Olivary Complex.

APPENDIX I

Tjossem, Denhoff & Hyman, from Intervention Strategies for High Risk Infants and Young Children. (p. 430-31) 1976

Neurodevelopmental Evaluation

One Year - Three Years

Name | Age/Months | Sex | Race

Date of Birth | Date of Evaluation

lbs/ozs/gms

Body length in/cm

Head Circumference in/cm

Chest Circumference in/cm

Blood Pressure

Pulse

Head Shape: Normal
Other

Fontanelles:
Closed (lcm) Open
Describe

Transillumination:
N
Other

Stigmata
Facies
Skin Pigmentation
Extremities & Spine
Other

General Physical Examination
Eyes
Opthalmoscopis
Ears
Nose, Mouth, Pharynx
Neck, Thorax
Lungs
Heart

Neurological Examination

Gait/Posture: N Abn

Describe N Abn

Describe

Face Symmetry: N Abn

Describe
Eyelids/pupils
Follow/Extraocular mvts
Strabismum/Nystagmus
Vision

Prehension: N Abn

Describe

Hand Pref. R I Both

Phonotation (tongue/gag/palate)

N Abn Describe

Hearing

Sensation, Extremities & Trunk:

Light Touch: N Abn

Describe

Abdomen	Pin Prick: N	Abn
Genitalia	Describe	
Extremities	Musculoskeletal: N	Abn
	Describe	
	Abn Movements: Describe	

Tonus	Bilat.	Rt.	L
Upper			
Lower			
Neck Flexor			
Neck Extensor			
Trunk			

Reflexes
Biceps
Triceps
Knee
Ankle
Clonus
Plantar
Sup. abd.

Postural Reflexes	N	Abn
Assym. T-N-R		
Moro		
Reciprocal kick		
Palmar grasp		
Rooting/sucking		
Neck righting		
Placing		
Parachute		
Reciprocal gait		
Landau		